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REPORTS

ON

ASIATIC CHOLERA

IN

REGIMENTS OF THE MADRAS ARMY

FROM 1828 TO 1844,

WITH

INTRODUCTORY REMARKS

ON ITS MODES OF DIFFUSION AND PREVENTION,

AND

SUMMARY

OF THE GENERAL METHOD OF TREATMENT IN INDIA.

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NIHIL EST ALIUD MAGNUM QUAM MULTA MINUTA.

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PREFACE.

In submitting the following reprint to the public, the editor avails himself of the usual privilege to offer a few prefatory remarks, with a view, first, of explaining his own connection with the papers contained therein, and, secondly, the reasons which have induced him to publish them in their present shape.

As editor of the Madras Quarterly Medical Journal from 1839 to 1844, in the pages of which these articles originally appeared, he was instrumental in first bringing them to the notice of the profession in India, and he has now resolved on republishing them in a collected form, from the conviction that in giving to them a more extended circulation he will only be acting in accordance with the wishes of the several authors and contributors; and that as they contain a large amount of practical

knowledge bearing on the causes, treatment, and modes of prevention of cholera, which would otherwise have remained for the most part unknown in England, such a contribution, embodying the experience of a number of Indian medical officers, acquired in a vast extent of territory from which cholera has never been absent for the last thirty years, will be found of general utility at the present juncture. It has been thought right to add a short introductory chapter, for the purpose of calling especial attention to the evidence which is contained throughout the reports on the subjects of the immediate or exciting causes, modes of diffusion, and the best means of preventing the outbreak and spread of cholera, with an abridged summary of the treatment which has been employed by the authors, shewing the estimation in which the various remedies have been held by a large body of intelligent practitioners.

To the Honorable the Court of Directors of the East India Company the editor begs to express his most respectful thanks for their patronage and support. It remains to acknowledge the obligations which he owes to the Members of the Madras Medical Board, and to the late Dr. Murray and Dr. Nicholson, Deputy-Inspectors of H. M.'s Hospitals at Madras, who allowed him

to select these reports from their official records; and to the Director-General of H. M.'s Medical Department, who, with the liberality which characterises all his acts, sanctioned the publication of the Reports of the Officers of H. M.'s Service.

To his friend Dr. George Pearse, Secretary to the Madras Medical Board, to whose kind assistance in arranging and selecting these papers for publication he has been greatly indebted, he takes this public opportunity of expressing his acknowledgment.

1, *York Terrace, Leamington,*
October, 1848.

REPORTS ON ASIATIC CHOLERA,

ETC. ETC.

INTRODUCTORY REMARKS.

The probability of Asiatic Cholera again visiting our shores has of late attracted great attention to the various works which have been written on the subject, and has tended to invest them with an interest which such books have never before possessed. Foremost in interest amongst the numerous productions on Cholera which have recently issued from the press in England, is the report of Mr. Thom of H. M. 86th Regiment, stationed at Kurrachee, printed by order of the House of Commons in 1848; and as the periodical press in India has also frequently produced many equally valuable papers on the subject by the medical officers of Her Majesty's and the Honourable Company's armies, who have witnessed the disease raging in the first regions of its birth, it is thought that a reprint of a series of them will not be without value at the present time.

The reports contained in the following pages were published in the Madras Quarterly Medical Journal, a work but little known in this country; they were selected, for the most part, from the official records

in the offices of the Medical Board and of the Deputy Inspector of Her Majesty's troops at Madras, written for the information of the heads of the medical department of the army; the authors having no thought of their reports ever being published, and never having revised them since they were first written; due allowance, therefore, will, it is hoped, be made for any inaccuracies of style. Each report details the circumstances attending the outbreak of an epidemic visitation of the disease in a particular regiment, in different years, either in camp or in quarters.

The meteorological phenomena observed; any peculiar geological formations existing near the place of its first appearance; the presence of the usual sources of malaria; the ventilation of barracks, or whatever could in any way be supposed to generate and assist the spread of the disease; the predisposing causes which could favour its production; its prevalence or otherwise in the vicinity prior to appearing in the regiment, are each carefully noted. The symptoms and treatment employed are recorded at the time as the facts struck each writer, and the inferences drawn are the results of the observations made during the epidemic seizure under report. The whole collectively forming a valuable treatise on the nature, causes, prevention, and treatment of cholera by numerous gentlemen who had seen the disease in all its various phases; and viewed in connection with the other older works on the subject, will form important links in the chain of investigation at present going forward in Europe.

Having briefly alluded to the general tenor of the contents of these reports, I shall remark more particularly on the evidence which they contain in respect to

some of the most important points which possess a practical and medico-political interest, viz:—

1st.—That cholera has its origin in other than human sources, and that the communication of the sick with the healthy is not necessary for its diffusion.

2d.—That cholera may be in many cases averted, and its mortality much lessened by proper precautionary measures being adopted.

The views here taken of the causes, modes of diffusion of the disease, and the probable certainty of avoiding its occurrence in many instances by the institution of a proper system of hygiene, I am aware, possess little novelty; but they are of value as showing that the opinions of practically experienced men in India have for years been in accordance with those which have recently been adopted, and are now generally advocated in Europe.

The first material cause of cholera is now generally admitted to be a specific poison, which, acting through the nervous centres, produces its deleterious effects by destroying the vitality of the blood. On the nature of this poison various ingenious speculations have been put forth; but whether it be gaseous or electrical, of animal or vegetable origin, is foreign to my present purpose to enquire, and probably in a practical sense this is of little value to be known.

The seeds of this poison may be present in almost all situations in India in a dormant state; but for the development of the disease certain exciting, or accessory causes are requisite; as, first, some sudden meteorological phenomena, brought about by a storm of thunder and lightning, accompanied by a heavy fall of rain in the hottest weather; secondly, crowding large

bodies of men into small imperfectly ventilated buildings; thirdly, decomposition of animal and vegetable matter, and effluvia arising from foul drains; fourthly, sleeping, particularly on the ground, in low swampy situations; and, fifthly, impure emanations arising from congregations of large bodies of men, whose constitutions are highly susceptible of disease from some particular circumstances.

I have assumed that there exists a primary essential cause—a specific poison—else why should the disease have disappeared in Europe since 1832?—and, that to produce the disease in full activity, certain accessory agencies are requisite, and that on a combination of these two conditions taking place, persons who are predisposed, either from their general habits of life, or some temporary circumstance in their condition, become the victims of the poison.

Since the first appearance of cholera in 1817, India has never been entirely free from it: occasional cases brought on by irregularity of diet, over-fatigue, and exposure, are every where met with; and an annual return of sick of a regiment without a notice of such an occurrence is an extraordinary event. Besides, we find that the disease may prevail amongst the inhabitants of some streets in a town to a great extent, whilst the neighbouring streets and the whole of the surrounding country are free from it. I have several times known such an occurrence in Madras. The Coom River winds very circuitously through Madras, and in its meanderings it nearly encircles the village of Chintandrepett. This river was made a necessary of by hundreds of natives daily throughout the year; and when the monsoon was heavy, and the bottom of this *Augean* stable was tho-

roughly cleansed, no ill resulted from it; but if the monsoon failed, and the river remained uncleansed, when the hot weather returned, the water became low, and the filth at the bottom was exposed to the heat of the sun, the smell was most offensive, and an attack of cholera was the certain result, its only victims being the inhabitants residing within a short distance of its banks.

In some years, however, the disease assumes an epidemic form, and becomes universally spread in all directions. We hear of the towns throughout the whole country being affected, and it is found making its inroads amongst the troops in all our garrisons; at such a time, should any ill-starred regiment be obliged to move from one station to another, its ranks are certain to be considerably thinned.

Two short tables are given to shew the general prevalence and mortality of the disease throughout the Madras Presidency.

Table shewing the comparative prevalence and mortality of epidemic cholera amongst Her Majesty's troops at eleven different stations in the Madras Presidency, from the year 1826 *to* 1843 *inclusive*:—

Station.	Admission.	Deaths.	Ratio of admissions per 1000 of strength.	Ratio of deaths per 1000 of strength.	Ratio of deaths per 1000 of attacks.	Number of years under report.
Fort St. George*	245	122	18.7	9.3	498.90	18 years, from 1826 to 1843 inclusive.
Bangalore . .	327	77	17.4	4.1	235.55	Ditto.
Bellary . . .	582	255	47.	20.6	438.84	Ditto.
Belgaum . .	1	1	0.1	0.1		6 years.
Secunderabad .	44	16	3.9	1.4	363.28	16 years.
Trichinopoly .	174	98	13.9	7.8	563.38	18 years.
Moulmein* . .	79	39	5.3	2.7	493.53	17 years.
Cannanore* . .	31	14	2.4	1.1	450.5	18 years.
Arcot	99	50	93.4	47.2	505.5	3 years.
Arnee . . .	175	44	48.6	12.2	252.152	7 years.
Kamptee . .	9	5	3.6	1.6	444.4	2 years.

* On the sea-coast.

General Table exhibiting the Total Admissions and Deaths from Cholera; the ratio of Admissions and Deaths to Strength, and the ratio of Deaths to Sick treated, amongst the Native Troops in the various Divisions of the Madras Army, from 1821 *to* 1844 *inclusive*:—

Divisions.	Admitted.	Died.	Ratio of Admissions to Strength per Thousand.	Ratio of Deaths to Strength per Thousand.	Ratio of Deaths to Admissions per Thousand.
Presidency*	1281	540	8.6108	3.6295	421.5456
Centre	2287	950	12.8292	5.3291	415.3913
Southern	2932	1254	17.9119	7.6608	427.6944
Malabar*	368	130	4.8689	1.7198	353.2608
Travancore*	149	33	7.5165	1.6749	221.4765
Mysore	2294	962	11.8143	4.9544	414.9970
Ceded	2388	923	23.3865	9.0392	386.6541
Northern*	2220	890	10.8088	4.3332	400.9009
Hyderabad and Jaulnah	4448	1666	20.0098	7.4947	374.5503
Nagpore	429	211	3.5978	1.8188	491.8414
Southern Mahratta ..	731	286	17.1890	6.7251	391.2448
Field Force, Dooab ..	1415	559	23.8560	9.4244	395.0530
Not specified	527	160	56.1534	17.0484	303.6053
Tenasserim Coast* ..	807	253	12.2130	3.8288	313.5068
Eastern Settlements* ..	16	2	0.4356	0.0544	125.0000
China*	54	16	5.2325	1.5503	296.2962
Scinde and Aden* ...	1	1	0.6523	0.6523	1000.0000
Total	22347	8836	13.5007	5.3382	395.3998

Regiments on the march are always the greatest sufferers from the disease, which may be accounted for, not only from the circumstance of large bodies of men being able to call the *virus*, as it were, into existence, but from soldiers, both Native and European,

* On the sea coast.

being at such times predisposed to disease from having to undergo great and unusual fatigue, their diet not being so good or so carefully prepared, and their meals taken at irregular times; from being exposed more than usual to the heat of the sun by day, and to cold and damp at night, from sleeping on the ground, and from deficiency of warm bed-clothing. A European soldier in garrison is usually confined to barracks during the heat of the day, and few take much active exercise morning or evening, (and many regiments have little drill, excepting in the cool season). A march of twelve or fifteen miles, carrying his arms and accoutrements, must, therefore, be most fatiguing to a man having led such a life of indolence, perhaps for two or three years. The Native soldier has, moreover, other more powerful causes operating against him: in addition to his arms and accoutrements, he carries his knapsack, containing his kit, which together amount to upwards of five stone, a weight far disproportioned to his strength. Sepoys, in marching from station to station, take their families with them, and are put to great expenses to procure carriage for them, so that they are barely enabled to purchase rice, and that often of the worst description.

Under the operation of such a combination of disadvantages it is not surprising that regiments marching from station to station are so constantly attacked with cholera in a country where the disease for ever lurks. To prove more fully that the causes enumerated do influence the production and diffusion of the disease amongst soldiers in camps, it is found that the converse of this occurs to small bodies of Sepoys on the march, —for instance, treasure detachments: they move without their families, live on their usual diet, and carry

their arms and accoutrements without knapsacks; they are not over-worked, and are well fed. Such parties are seldom attacked though they pass through the villages in which the disease rages. European detachments, marching to join their regiments, composed of young men just arrived in the country, and probably lately landed and unused to the heat of the climate, are, on the contrary, often attacked; thus showing that fatigue, irregular and unaccustomed diet, and sleeping exposed to damp and cold at night and the heat of the sun by day, are the great predisposing causes in such cases. Again, officers marching with regiments enjoy an extraordinary comparative exemption from the disease; they ride on horseback; live well on their ordinary diet, have their meals at the usual hours, and sleep warmly on good beds; such people are seldom attacked until the disease is spread widely through the camp.

In illustration of the truth of these assertions, the following tables are given from the Report on Cholera by Dr. Lorimer, published at Madras in 1846:—

Table shewing the effective strength of the various corps, the number of marches made under each given strength, attacks, &c., from 1820 *to* 1844 *inclusive*:—

Effective strength.	Number of Marches.	Attacked.	Escaped.	Ratio of attacks to marches per cent.
From 100 to 300 Men	53	10	43	18.867
300 ,, 500 ,,	75	15	60	20.000
500 ,, 700 ,,	98	21	77	21.428
700 ,, 900 ,,	239	54	185	22.594
900 ,, 1100 ,,	108	35	73	32.407
1100 ,, 1534 ,,	99	9	20	31.034
	602	144	458	23.920

Table shewing the effective Strength of the various Treasure Detachments, the Number of Marches made under each given Strength, Attacks, &c. from 1820 *to* 1844.

Effective Strength.	Number of Marches.	Attacked.	Escaped.	Ratio of Attacks to Marches per Cent.
Under ....10 Men	11	..	11	....
From 10 to 20 ,,	24	..	24	....
20 ,, 30 ,,	43	..	43	....
30 ,, 40 ,,	59	1	58	1.694
40 ,, 50 ,,	57	..	57	....
50 ,, 60 ,,	60	2	58	3.333
60 ,, 70 ,,	19	1	18	5.263
70 ,, 80 ,,	17	1	16	5.882
80 ,, 90 ,,	18	..	18	....
90 ,, 100 ,,	23	1	22	4.347
100 ,, 187 ,,	21	2	19	9.523
	352	8	344	2.272

In towns the first victims usually are the poorest of the inhabitants, living in dirty low situations, and on bad food, and I have known the natives themselves attribute an outbreak of cholera to a bad sort of rice, and an inferior species of fish, which frequently forms the diet of the poorest classes of natives. The disease having once commenced amongst these people, spreads itself to portions of the town inhabited by the better classes.

At the time of the prevalence of an epidemic, fear appears to be a powerful predisposing cause, many instances of which I remember; and I knew one case of a young officer who fell a victim to an attack attributable entirely to it.

The appearance of cholera in the 2nd European Light Infantry *(see Chap. VIII.)*, and in the 24th Native Infantry *(see Chap. II.)*, is to be attributed to one and the same cause. The men in each regiment had been free from it up to a certain day; it was not prevailing in the neighbourhood of either regiment, and no one was supposed to have arrived amongst them from an infected place. In both cases there was a heavy fall of rain, a sudden reduction of temperature following immediately; and within a few hours (forty-eight in one case and thirty in the other) the disease broke out in its worst form. The disease was known frequently to prevail in the situations where the occurrences happened. The men of both regiments were susceptible of infection; the Sepoys from the predisposing cause, which I assumed to exist generally amongst this class of people in camp; and the Europeans, who were young soldiers, (the regiment having been formed only a few months,) from the peculiar debilitating causes noticed. The disease is shewn not to have existed in either regiment before the fall of rain on the 23d of May, and the 2d of March, and to have broken out nearly at the same time in each case after the rain. We may therefore infer that the seeds of the poison were present in a dormant state in those situations, and were called into active existence by the sudden fall of temperature, finding constitutions predisposed to receive it; though how brought about I do not pretend to say, but certainly independently of human contagion. The officers of the European regiment escaped, though they lived in the same fort and in very bad quarters; but they were not new to the country, having been drafted from other regiments,

and were acclimatised, and therefore not subjected to the same depressing causes as the men; the officers of the native regiment all escaped but one.

In the cases of the 13th Lt. Dragoons *(see Chap. VII.)*, 27th Native Infantry *(see Chap. XII.)*, and the 62d Foot *(see Chap. I.)*, the exciting cause of the outbreak of the disease was attributed by all the medical men to one source—malaria. The disease in each of these regiments occurred in the same tract of country, where it is known to prevail at most times, but it did not exist at the time of their approach. It would, however, appear to have been lurking in its known habitat, and only required the conditions necessary for its production to be called into operation; and such materials were found in the large bodies of men composing these camps.

The 45th Foot were also attacked when marching through this district, at a time when the inhabitants were free from the disease; its outbreak, in this instance, was attributed by the surgeon to intemperance. Although it raged amongst the soldiers, women, and children, it was not until after one month that any native was attacked; yet 250 dooley-bearers were daily employed in carrying the sick, and numerous native attendants were constantly employed in the hospital tents; neither was it communicated to the villages as they passed.

H. M. 63d regiment *(see Chap. XIV.)* also took the disease in passing the same district; the wind prevailing at the time was supposed to be accessory to its invasion, as the cases became milder, and it gradually subsided on a sudden change of wind taking place to a

directly opposite quarter; after this time the weather became fearfully hot, (the thermometer ranging from 106° to 115° in the tents,) acting as a predisposing cause, similar to the case alluded to in the 2d European Infantry; there was no escape from the baneful influence of this terrible heat, hence the officers suffered in an equal ratio with the men, contrary to what is usually seen. At last the regiment was marched into barracks, and the disease gradually left them, nor was it communicated to the inhabitants of the station.

The fort of Bellary has at all times suffered much from the disease, so much so indeed that Dr. Parry remarks, "that it may there be considered indigenous, and justly entitled to the designation of endemic. The seeds of the poison appear to be, as it were, sown in this place."

The climate and situation of Bellary is thus described: "an intense heat, a cloudless sky, great glare with strong gusty hot winds, are the predominating features of the climate in the day-time, with considerable reduction of temperature at night; very little rain falls in this part of India." "Around Bellary the soil becomes granitic, from the debris of the granitic mass of rock, round, and on which the forts are built. The regur soil forms nearly a level surface, but from Boodeaul the copper mountains vary, and bound the scene on the west. From their basis, the plain of the regur soil stretches to the east, and about five miles in that direction a rounded mass of rock, about half a mile in diameter, rises up, obstructs the view, and breaks the uniform level which otherwise unvariegated would have stretched to the north and east. The rock of Bellary is about 500 feet

high; it is composed of granite, in which the quartz is large and smoky. The felspar is of various colours, some dusky and glancing, others yellow and red; the sizes of the crystals are variable, but large masses of rocks exist, having almond-shaped crystals, and others rectangular. To the north-west of the main rock, there is a second of the same sort of stone. This rock has a hollow in the middle, as if there were two rocks instead of one. I saw veins of dusky quartz running through the solid rock, and parallel to them, veins of diallage. There are dykes of basalt in some places, and fragments also of basalt at the base, and in the fort wells. The plain sweeps in close to the very bases of these rocks, but the soil there is granitic." Here we look in vain for the usual sources from which cholera is known to emanate; and yet it is found year after year that the disease visits the inhabitants residing within this fort, breaking out suddenly without any appreciable change in the state of the atmosphere, and at a time when it is unknown in the surrounding country.

The epidemic described by Dr. M'Gregor *(see Chap. IV.)* appears to have been first excited by a sudden atmospheric change; as we find it reported, that "on the 21st and 22d of March there were a few showers and much lightning, which, as it was without thunder, was passing from the earth to the clouds. Cholera appeared on the 21st of March in a sergeant belonging to a company stationed at the western barrack." The poison, being thus called into active existence, found in the crowded fort all the conditions necessary to foster and multiply its virulence; and the causes to which this attack are attributed are sufficiently obvious.

But we find it has been, and still, I believe, conti-

nues to be an annual visitant to this ill-fated spot; and so mysterious have these attacks been, and its ravages so strictly confined to the locality of the rock, that it has been suggested by several, whether the formation of the rock itself may not in some way be instrumental to its production, by being the medium through which some peculiar electrical state of the atmosphere occurs; and an ingenious theory has been started on the supposition that the cause may arise from some telluric miasm, and how far it is possible that the geological formations in the neighbourhood may be adjuvants in the mischief by causing "the spontaneous evolution of sulphuretted hydrogen." I profess myself ignorant in this matter, but throw out the suggestion for the consideration of the geologists and the chemists.

The authors of all these reports, excepting one, have recorded their deliberate opinions that the disease did not originate from contagion, and I believe the general voice of the medical profession in India has always been in favour of this doctrine, and the non-contagion of cholera is received as an axiom by all non-medical persons, both European and native. Dr. Lorimer alone amongst these authors appears to have entertained an opposite opinion; but I have reason to think that in after years his ideas on this subject became much modified. He rests his belief in the "human origin" of the outbreak on the possible contingency of some of the followers, amongst whom the disease originated, having wandered from the camp to the villages on the road, and there communicated with infected persons; yet he admits that the country was reported to be free from the disease at the time the troops were passing.

I think that the instances which Dr. Lorimer *(see*

Chap. II.) and Mr. Innes *(see Chap. XII.)* adduce as attacks arising from contagion, may be fairly attributed to an intensity of the causes most likely to induce a susceptibility to disease, as we find that in numerous other instances the hospital servants were not more liable to attacks than other persons. The attacks of the hospital attendants (who were orderly Sepoys appointed to attend on their sick comrades and relations) may be accounted for by supposing that the appalling scenes of suffering which they must have witnessed whilst on this duty in a crowded hospital tent, combined with the known disinclination which most natives of India have to touch or even approach the sick and dying, would have a powerful effect in predisposing such persons to imbibe the poison; and the attacks "of whole families in succession" may fairly, I think, be ascribed to the want of sufficient proper food; all are more or less subjected to hardship on a march, but more especially men with large families. When all were equally exposed to the epidemic influence, those on whom the accessory causes of disease pressed the heaviest would of course be the most obnoxious to attack; Dr. Lorimer himself having said, "I have not been able to make one positive observation, except that fear and dread of the disease, and an insufficient quantity of food appear to favour its action."

In Scot's Reports on Cholera some very remarkable instances are given, showing an immunity from the disease under most intimate personal intercourse. "In the hospital of the Royal Regiment, only one individual out of 101 attendants was attacked by the disease." "Many medical officers appear to have slept in their

hospitals without suffering any bad consequences. At St. Thomas's Mount, where a general receiving hospital was established for patients with cholera, and where the numerous attendants were people not at all accustomed to hospitals, not one of them was taken ill; yet it was not uncommon to see them using the bed-clothes of patients who had just recovered or died." Again, Mr. Gibson says, "I had ninety-two admissions, and increased the establishment of servants to double; I lived in the hospital amidst the sick, day and night; and yet neither I myself nor any of the servants got the disease."

In the report of the 34th Light Infantry facts are related which bear strong *primâ facie* evidence of the contagious origin of the disease. Yet, when we consider that it was steadily advancing towards the station, and was known to exist within a few miles, and we find the situation of the lines of the regiment reported "as very unhealthy and exposed to malaria," we may infer that the people dwelling there would be most likely to become the first victims of its attack, and I think the conclusion come to by Mr. Lawrence is correct.

I could from my own experience relate many circumstances bearing on these points, but the reports contain sufficient evidence, in themselves, to satisfy any one that cholera is a disease called into action in certain localities from finding in such situations the conditions necessary to its production, without the intervention of human contagion.

There remains to be mentioned one source from which cholera may be propagated—the assemblage of great

bodies of people—for instance, the attendants at native festivals, and persons composing large camps. The effluvium arising from the heterogeneous and impure masses collected together on these occasions, undoubtedly acts as an exciting cause in producing the disease, in places where the seeds of the poison are known to be usually found, though the country may have been healthy before. This is known to take place at Conjevaram and Trippety near Madras, and at Juggernaut it is said to be an annual accompaniment to the festival. "At Juggernaut *(see Chap. XVII.)* it is an annual visitant. The town of Pooree contains 35,000 inhabitants, and the number of pilgrims sometimes amounts to 150,000. The inhabitants are usually quite healthy before the occurrence of the festival, which takes place in June or July; but immediately on the arrival of the pilgrims and when the lodging-houses are literally crammed with inmates, cholera suddenly breaks out, and in the space of a few days hundreds are cut off by it. This is not an occasional or accidental occurrence, it is an invariable one; and the disease which had thus been generated as suddenly disappears on the dispersion of the crowd, a few isolated cases only occurring for two or three days after the departure of the pilgrims."

The disease when produced attaches itself to the mass, and is by them transported from one place to another, and in this way disseminated to persons who were previously free from it. The truth of this appears to have attained general belief, and with justice, as we have, I think, evidence to prove. Dr. Henderson *(see Chap. IX.)* believed that on one occasion the disease was brought into the garrison of Bellary by a regiment of

Native Infantry which was passing, and Dr. Parry *(see Chap. X.)* also relates a similar circumstance occurring at the same place; and Dr. Mouat *(see Chap. VII.)* remarks, " though we do not deem the disease infectious or contagious, it is proper to state that it broke out in one village after the regiment encamped in its vicinity:" the opinions of these gentlemen must have much weight. No doubt such cases do occur, yet we must not confound them with contagion. If large bodies of men are capable, by their congregating together, of exciting the dormant seeds of the poison to action, such bodies moving from place to place are of course capable when in motion of retaining the same power. So long as these large assemblages of men continue in a mass, this power of production remains, but it is lost immediately they separate; we see that at Juggernaut the disease leaves the place with the pilgrims, and on a regiment in which it prevails being broken into detachments, and each marched in a different direction, it is soon lost.

In support of this position, I will mention the following circumstance:—" A number of Europeans came from St. Thomas's Mount, where the cholera was raging, to Poonamallee, which was free from disease. In the course of a few days twenty-two of them were seized with cholera, whilst not one of the other Europeans at Poonamallee was attacked."

Another very apt illustration of the mode in which the disease may be disseminated in this way is given by Dr. Henderson. An officer travelling with his family and a large assemblage of native followers arrived one morning on the ground which a regiment of

native infantry, suffering from epidemic cholera, had just quitted: the bodies of five individuals belonging to this regiment were left on the ground unburied. This gentleman and his retinue remained here during that day, and in the evening marched into Bellary (a distance of twelve miles), and took up his abode at a friend's house. There was no cholera at the time in Bellary. On the second night, cholera appeared amongst the native followers of the gentleman, and in the course of two or three days nineteen were attacked, of whom seven died. As soon as the circumstance became known to the authorities, this officer was ordered to quit the cantonment with his followers. Not a single case of cholera occurred in Bellary, a place notoriously liable to attacks, after they left it; and not one of the native servants of the gentleman at whose house they resided during their stay took the disease, though living for several days within a hundred yards of the travellers' tents; and, from knowing the habits of natives, I conclude constant communication must have been carried on between them, though ordered not. (Natives are not contagionists, but fatalists.)

Here the disease was inherent in the large body of people composing the camp; the air surrounding them had become tainted with the disease, which was evidently following in their wake, and when these healthy people arrived within its range it immediately seized upon them. Whether it originated from the dead bodies (as was supposed) or from the general infected state of the atmosphere matters little; its cause was evidently local, and was not capable of being conveyed away from its track by the small number of persons who had there imbibed it. It was not disseminated

amongst the inhabitants of Bellary, shewing that the disease was not contagious in the common acceptation of the term; that is, capable of being conveyed from man to man, similar to other diseases possessing notoriously contagious properties; and that the contagion exists only in the mass; and though individuals may contract the disease from this source, they are incapable of carrying it and becoming the means, in their own persons, of disseminating it.

It is, therefore, a fair inference that this power of transmitting the disease inherent in large bodies of men is only potent so long as the mass of the people is large, "the poison is rendered virulent by numbers," and is weakened and lost in a geometrical ratio according as the numbers are diminished, and the air around them becomes purified; so that in single cases it becomes so feeble, or diluted, as it were, that its power is at last lost. If such were not the case, we should hear of frequent instances of a single individual proceeding from an infected town or camp where the epidemic influence was rife amongst the inhabitants, to a place at a distance which was free from the disease, and thence communicating it to healthy persons.

I have had opportunities of perusing all the reports in the offices of the Medical Board and the Deputy Inspector of H. M. Hospitals of Madras, for a series of years, and I cannot call to my recollection one instance on record in which the disease was supposed to be communicated in this manner, excepting one mentioned by Dr. Murray (himself a thorough non-contagionist). He writes:—"A circumstance which excited a strong suspicion of the disease being contagious occurred about

this time at St. Thomas's Mount. A pensioner, who came from Bangalore along with the 13th Dragoons, left their camp at Koratoor on the 6th of January, and arrived at the Mount on the 7th; and on the 8th he was attacked with cholera, and admitted into the Artillery Hospital. On the 9th the first division of the 15th Hussars landed at Madras, and marched to barracks at the Mount, the sick being received into the Artillery Hospital. The pensioner with cholera, above mentioned, was removed, with his bed and bedding, into an outhouse, to make room for the sick of the Hussars, and the patient who was put into his place was seized with well-marked symptoms of the disease in three days afterwards." If such cases were numerous, I should at once admit this as one of contagion; but the circumstance of its standing alone renders it one of little weight. Cases of sporadic cholera from irregularity of diet are of every day occurrence; and in the confusion necessary on a disembarkation of a regiment, the hospital discipline would of course be lax, and it is more than probable that this man had been able to procure some improper food, and that this case of doubtful contagion owed its origin to a fit of indigestion.

An opinion prevails that the disease may become contagious to persons only inhabiting situations in which the sanitary arrangements are notoriously deficient; the instances quoted by Mr. Lawrence may have had such an origin. If such be the case, it affords an additional reason for an extended system of hygiene. On this point, however, we have no conclusive evidence.

In relation to this manner of transmitting the disease, the period of incubation which is necessary for its produc-

tion becomes an important matter for consideration. This would appear to be most uncertain; in the case related by Dr. Henderson it seems to have been scarcely two days; in a report of the Transactions of the Medical and Physical Society of Calcutta, by Mr. Baker, on the period which may elapse between the first impression of the causes of cholera and the developement of the disease, illustrated by numerous cases, three days appear to have been the usual period. Dr. Mouat says, "he is strongly inclined to infer that the seeds of the disease may remain inert much longer in the system than is generally supposed;" and he gives twenty-seven days as the time sometimes requisite for its maturation. One instance in relation to this subject occurred in a ship proceeding from Bombay, where the cholera was raging at the time, to Singapore, carrying native convicts. Cholera broke out amongst these people after the ship had been eighteen days at sea; here we must conclude that the disease had been imbibed at Bombay, or that the ship itself had become a depositary of the poison.

Before quitting this subject it may be well to mention the frequent occurrence of an attack of cholera being brought on by a dose of purgative medicine, particularly aperient salts. Mr. Twining says that he has known an attack of cholera result from the administration of every sort of aperient medicine, except castor-oil, during the prevalence of an epidemic. I know an instance in which one officer lost his life from cholera produced from taking a seidlitz powder, and another from a dose of colocynth; and in the natives of India I have seen frequent cases resulting from a dose of croton oil, the ordinary purgative used by them; during the prevalence

of epidemic cholera great precaution is therefore obviously necessary in the use of purgatives, as the disease may be called into existence by the over-action of such medicines.

Having shewn the opinions which are entertained by medical men in India regarding the nature, causes, and mode of diffusion of cholera, it is not surprising to find them constantly advocating sanitary measures to avoid the outbreak and spread of the disease. On this subject the opinions of the authors of these reports are singularly accordant: all concur in stating that the causes of the disease are in many cases remediable, and shew that if proper precautionary measures were pursued, and a dutiful care and attention were paid to what experience has taught to be advantageous and necessary for its prevention, we should have comparatively little cholera in our garrisons and camps in India.

The causes which operate in producing the active principles of this disease have been fully recognised for many years by medical men in India; but if such sanitary suggestions as their experience warranted them in making were disregarded by those with whom the power rested of carrying out alterations and improvements, the "blame" of such neglect should not be cast on the "medical profession," whose opinions on this all-important point, unhappily for the sake of humanity, have not been allowed to have their just weight. The constitution of the medical services of the Indian armies has in some way contributed to this. The heads of the medical department have not an opportunity of bringing prominently to the notice of

the head of the army, except through the office of the adjutant-general, the suggestions contained in the various medical reports submitted to them, and of enforcing by *personal* representation the urgency and importance of attention being paid to such points.

Other general causes have operated most injuriously in opposing all attempts to mitigate this scourge. In all communities there are found numerous individuals who are wont to point to every general attack of sickness as evidences of divine retribution, and cholera has not failed frequently to come under this category; and the whole subject has been considered as one of those mysterious interpositions, which our understanding is too feeble to comprehend, and which all human means are unavailing in preventing, without waiting to inquire how far the causes might be attributed to our own habits, customs, and regulations. Others, again, (and unfortunately men in influential situations.) seeing the disease prevail so widely and constantly, without inquiring into the conditions which have always been found accompanying its outbreaks, have been induced to look upon it as a necessary evil in India, and treated all endeavours to lessen its ravages as chimerical, and designate the opinions of medical men, who have advocated measures for its prevention, as useless, and viewed them as innovations on their own official prerogatives.

Occasionally, however, the suggestions made by medical officers, and the improvements pointed out by them, have been carried out with the happiest results, of which the following is an example. The native regiment inhabiting the Vepery lines in Madras had constantly in each succeeding year, whenever cholera

prevailed in the neighbourhood, suffered from the disease; and on an occasion of this sort in the year 1840 the medical officer pointed out "the means which he considered would prevent the spreading of the epidemic amongst the men:—1st. The principal or main drains, being obstructed, should be opened. 2nd. The low ground adjoining the light company lines, which emits offensive effluvia, should have a covering of one foot of sand or earth, and the tank near the hospital should be filled up. 3rd. The burial-ground opposite the former tank, being also very offensive, should have a coating of sand or earth in the same way and of the same depth; the ground at present is partly under water, and emits very sickening effluvia; the bodies of the people buried here are not more than one foot and a half or two feet below the surface." These suggestions were carried out; and, on inquiry after two years, I ascertained that the men inhabiting these lines had not suffered from the disease since, though it had raged in the neighbourhood severely several times.

Now that the cause of sanitary reform has been so warmly taken up in England, it is much to be hoped that it may be extended to our Indian possessions; and that this long-neglected but important subject will also be followed up by the Indian Governments, who, it is hoped, will at length be convinced that cholera is a disease amenable to sanitary rules, and that its ravages may be lessened by proper precautionary measures.

In a subsequent chapter it is my intention to give a summary of the symptoms and treatment of cholera, as evidenced in these reports.

CHAPTER I.

Report on Cholera in H. M. 62nd Regiment on the March from Bangalore to Masulipatam in 1833.

In the year 1832 the good health of the regiment was conspicuous, the casualties amounting to but thirteen.

Influenza (acute catarrh), which had been prevalent in several parts of the Presidency towards the close of the year, showed itself at Bangalore, first and chiefly amongst the native corps, afterwards in the 62nd regiment, five men having been then attacked, fifty-eight in the month of January, 1833, and one in February. This disease, although not fatal, was liable, without active treatment, to become protracted, and very probably had a debilitating influence for some time afterwards.

On the 18th of February, the regiment (strength 542) commenced its march for Masulipatam, under such circumstances that a happy issue could scarcely be anticipated. The season was extremely hot, the year notorious for its general insalubrity, cholera morbus prevailed, and the country through which the march led was, for a considerable distance, the same tract in which the 45th lost so many men last year, and was suffering from long-continued drought. The commanding officer having in view the unhealthy state of the country generally, more especially in regard to cholera, every precaution was taken to uphold and to support the strength of the men, to obviate the more ordinary occasional causes of this disease, and to detect and subject it to early treatment when manifested.

From Bangalore to Palmanair (the top of the Ghaut) the weather was cold in the morning, in the evening tolerably cool and pleasant, but oppressively hot in the middle of the day.

26th Feb., Palmanair.—Morning, thermometer 68°, noon 91°. 2nd March, Chittoor, second stage from the bottom of the pass.—Morning 67°, noon 100°, evening 88°.

To this latter place (Chittoor) it appears that, according to the reports of the cutwalls, the villages through which the regiment had hitherto passed were at the time free from cholera, although it had recently prevailed; but that at this station several were carried off by it daily.

As yet from Bangalore (distance 118 miles) there had been but fifty admissions, and those of the more ordinary diseases, only thirty-one remaining on the 1st March.

Nothing remarkable occurred on the march of the corps till its arrival at Keilgherry, and here cholera Indiana made its appearance with great severity. The origin of the disease may be traced to Chittoor, a few cases amongst the inhabitants having daily occurred there; whilst on the route from thence to Masulipatam, with the exception only of Vellore, not a single instance of the malady in the villages presented itself, although they had most of them suffered from it a short time previously. The principal losses were sustained between Keilgherry and Woojelly. The topographical situation of the whole line of this road seems peculiarly favourable to malaria, inasmuch as it runs between a high ridge of mountains, which are oftentimes thickly studded with jungle, encroaching in many places so closely on the road that it has the appearance of a pass. From the time this epidemic appeared amongst us to the period of our arrival at Masulipatam, (associated with a long list of other formidable diseases,) it continued to be the destructive companion of our way. It cannot, therefore, be a matter of surprise that not only the remedies employed, which are of a very debilitating nature, but that also the injurious effects of the disease itself on the constitution, should have placed the regi-

ment in a most unfavourable condition to withstand the mischievous atmospheric vicissitudes of India.

History of events.—On the 2d, cholera manifested itself in a camp color man who had preceded the regiment from Chittoor to Keilgherry; next morning a woman, when marching with the regiment, was attacked; and in the course of that day eleven men and one woman were seized, when three men and the woman died.

Next day, the 4th, at Cottah Cottah, eighteen men and one child were attacked, of whom nine men and the child died.

5th, Permapauk, twenty-eight men and one woman were attacked, and two men and a woman died.

6th, Chundergherry, nine men, six women, and four children were attacked, of whom one man, one woman, and three children died.

7th, at Curcumbuddy two officers, nineteen men, six women, and one child were attacked; one officer, one man, and three children died. Thermometer 6 A.M. 74°, mid-day 99°.

9th, at Callastry fourteen men, five women, and six children were attacked; six men and two children died. 10th (halted at Callastry), four men, four women, and one child were attacked; six men and two children died. 11th, Pallakoor, fourteen men attacked; no deaths.

12th, Woojelly, nine men and one woman were attacked; one man died.

13th, halted at Woojelly; ten men, three women, and two children attacked; one man, one woman, and two children died.

From Chittoor to this place (about ninety miles) the disease, according to the returns and report of Mr. Radford, manifested itself with the greatest force, two officers, one hundred and forty-six men, thirty women, and eighteen children having been attacked, of whom one officer, thirty-two men, six women, and twelve children died.

The most ordinary manifestation of the invasion of the disease was an affection of the stomach and bowels, the more general

time of attack from a little before starting in the morning till a short time after reaching the new encamping ground.*

When seized on the line of march, a non-commissioned officer of the company fell out with the man attacked, who reported him to the officer of the company, and then conducted him to the surgeon, who was in the immediate rear, provided with all the requisite means of affording relief. To detect those taken ill in the tents during the night, non-commissioned officers were enjoined to watch such as might frequently leave the tent, and there is reason to think they were abundantly attentive; with the same intention sentries were placed between each line of tents.

It appears that men on the baggage guard were, from their prolonged exposure to the sun and other causes, particularly liable to be attacked, and from the later detection of the disease (no medical officer being present) more subject to suffer from it; this guard was as much as possible reduced.

It has been observed that the great violence of the disease manifested itself between Chittoor and Woojelly, when, in the course of twelve days, there were attacked two officers, one hundred and forty-six men, thirty women, and eighteen children, of which number one officer, thirty-two men, six women, and twelve children died; while in thirty-one days from Woojelly to Masulipatam there were attacked eighty-two men, sixteen women,

* The similitude in every particular between this visitation of cholera and the outbreak of the epidemic in the 27th Native Infantry in 1838 must strike all our readers.

The line of road from Chittoor to Masulipatam, through which the 62d regiment moved, has proved on several occasions peculiarly productive of this terrible disease. In the year 1832, H. M. 45th regiment, marching from Arnee to Masulipatam, had one hundred and fifty-three cases admitted, with one hundred and one deaths. In H. M. 62d, as here shewn, three hundred and ten men, women, and children were admitted, with seventy-nine deaths. In the 27th regiment of Native Infantry in 1838 there were one hundred and forty-eight admissions and sixty-seven deaths. The 16th Native Infantry also, in marching from Palaveram to Cuddapah, encountered this disease in passing over this very spot, and lost upwards of sixty men.—[Ed.]

and twelve children, of whom nine men, six women, and three children died.

From henee (Woojelly) the regiment entered upon a flat and open eountry, the route passing through Nellore and Ramahpatam, and by the sea road to Masulipatam.

With a view of recruiting the men and of improving the health of the numerous convaleseents, the regiment was halted during four days at the former plaee (Nellore), and with mueh benefit: they were enjoying the sea breeze. Thermometer at 6 A.M. 74°, noon 99°, evening 86°.

From Ramahpatam the road was often through deep sand, oeeasionally interseeted by inlets of the sea, heavy and fatiguing; the temperature, too, became hot and oppressive, caused by radiation from the sand: the wind itself blowing over it became extremely hot.

At Vellatoor, on the south bank of the Kistnah river, an officer died from apoplexy. Thermometer ranging from 80° to 99°; on the following day it ranged from 84° to 95°. There were twenty admissions added to the siek report, *five* from *apoplexy*, of whom two died. Weather squally, and during the night there was a heavy fall of rain, the first experienced sinee leaving Bangalore. On the following day the range of the thermometer at Mulloor was from 79° to 95°; one fatal ease oecurred from apoplexy.

On the 13th the regiment arrived at Masulipatam, and was eneamped about a mile to the north-west of the fort, upon a part of the swamp with which it is surrounded, but then dry; on the morning of the 16th the men marehed into the fort and oceupied the barracks.

From leaving Bangalore (18th of February) it will appear by the aeeompanying table that the number of admissions amounted to nine officers, three hundred and eighty-two men, sixty women, and forty-three ehildren, of which number two offieers, forty-five men, thirteen women, and sixteen children died, and three offieers, ninety-two men, six women, and seven children remained siek.

The men did not seem to attribute the eholera to any cause,

nor did they appear apprehensive of being liable to take it from their comrades; and it is deserving of remark, that although a man in each company was daily told off for the duty of attending his comrades in hospital, yet an attack of the disease was on no occasion traced to this circumstance, nor even, as far as is known, suspected.

Of the hospital servants, five were attacked, and two (coolies) died; very few of the soldiers in hospital for other diseases were attacked.

Many of the followers are said to have suffered; but neither the number nor mortality could be ascertained; as usual with them, when taken ill they remained behind, and many from fright ran away.

Return of Diseases in His Majesty's 62nd Regiment, during its march from Bangalore to Masulipatam, from 18th February to 15th April, 1833, inclusive.

DISEASES.	Officers. Strength 25.				Men. Strength 526.				Women. Strength 85.				Children. Strength 165.			
	Admitted.	Discharged.	Died.	Remaining.	Admitted.	Discharged.	Died.	Remaining.	Admitted.	Discharged.	Died.	Remaining.	Admitted.	Discharged.	Died.	Remaining.
Febris, cont. com.	2	1	..	1	18	9	..	9	7	5	..	2	1	1	..	..
Pneumonia	..	..	..	..	2	2	..	..	..	..	..	..	..	..	..	..
Peritonitis............	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..
Hepatitis acuta........	..	..	..	..	5	3	..	2	..	..	..	..	1	1	..	..
Hepatitis chronica	1	1	..	..	....	....	..	..	..	..	..	..	..	..	..	..
Splenitis	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..
Rheumatismus	..	..	..	..	2	1	..	1	..	..	..	..	..	..	..	..
Variola	..	..	..	..	....	....	..	..	..	..	..	..	1	..	1	..
Dysenteria acuta	..	..	..	..	22	8	1	13	3	2	1	..	4	..	..	4
Apoplexy	1	..	1	..	10	2	3	5	..	..	..	..	..	..	..	..
Colica	..	..	..	..	24	22	..	2	1	1	..	..	1	1	..	..
Cholera morbus	..	..	..	..	11	5	..	6	..	..	..	..	..	..	..	..
Cholera Indiana	2	1	1	..	232	154	41	37	46	80	12	4	30	13	25	2
Diarrhœa	1	..	..	1	1	....	..	1	..	..	..	..	1	1	..	..
Syphilis..............	2	1	..	1	24	17	..	7	..	..	..	..	..	..	..	..
Obstipatio............	..	..	..	..	8	5	..	3	1	1	..	..	..	..	..	..
Ulcus	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..
Dentitio	..	..	..	..	....	....	..	..	..	..	..	..	2	1	..	1
Other diseases	..	..	..	..	20	14	..	6	2	2	..	..	2	2	..	..
Total	9	4	2	3	382	245	45	92	60	41	13	6	43	20	16	7

Return of Officers, Men, Women, and Children who died since the arrival of His Majesty's 62d Regiment at Masulipatam from 13th April, 1833, to the 6th September, 1834.

	DISEASES.																							
	Febris Quo. Inter.	,, Remittent.	Febris Intermittent.	,, Con. Com.	,, Remit. Bil.	Peritonitis.	Hepatitis Ac.	Hæmoptysis.	Phthisis Pulmon.	Hæmorrhois.	Catarrhus Ac.	Dysenteria Ac.	Dysenteria Chron.	Apoplexia.	Cholera Ind.	Diarrhœa.	Diabetes.	Mania.	Anasarca.	Hydrothorax.	Ascites.	Obstipatio.	Scorbutus.	Total.
Officers	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	3
Men	4	6	10	10	16	2	11	1	1	1	1	63	3	20	25	3	1	1	3	1	1	1	8	194
Women	0	0	9	4	1	0	2	0	0	1	0	3	0	0	8	0	0	0	0	0	0	0	0	28
Children	0	17	21	20	6	0	0	0	0	0	0	20	0	0	0	5	0	0	0	0	0	0	0	89
																							Total........	314

Sixty-one of the fatal cases were at their commencement violently spasmodic. Of this number, two-thirds were in a state of collapse on admission, pulse scarcely perceptible, and the skin cold. When this disease first made its appearance, the interval from excitement to collapse was extremely short, and the casualties very numerous: from the 3d to the 10th of March was the most fatal period. During the march, there were 228 cases and 41 deaths. On arriving at Masulipatam, this formidable disease again presented itself, still spasmodic, of a more congestive form than previously, and having a greater tendency to fatal termination. I have carefully examined 60 cases terminating favourably, occurring at the time when the epidemic was most destructive, and there were only 11 cases of spasm, and 9 in which the pulse was not good; there was no peculiarity out of the usual routine, with the exception of the spasms which accompanied the most fatal form of the epidemic, requiring notice.

Treatment.—Respecting the treatment of cholera, I have to observe, that all those remedies, many of which have stood high in public estimation, have been administered by me, and with less benefit than I had anticipated. I still feel the greatest confidence in venesection, where the pulse is good and the skin

warm; the exhibition of calomel with small doses of opium; and the immediate recourse to stimulants after depletion. These I consider the chief means in preventing collapse, but where that has taken place, all is chance and uncertainty: the nervous energies are so overpowered that the stomach cannot be acted upon by the strongest stimuli; neither can the secretions be promoted by calomel, the absorbents being so torpid that they cannot convey it into the system. The croton oil has been made use of largely in the hope of emulging the biliary ducts, but without any beneficial result. At the same time that I state these opinions, I beg to remark, that the disease varies so much in its malignant tendency, that the remedies which have proved beneficial in one epidemic, in a succeeding one may prove inert.

The following is a copy of my quarterly Report, ending in December of the same year.

" During this quarter, five cases of cholera Indiana occurred, three mild, the last two spasmodic;—in both on admission there was heat of skin, with tolerable pulse, and about a pound of blood was extracted from each individual, and the usual routine of medicine employed,—calomel, frictions, hot sand-bags, but without advantage. Congestive symptoms rapidly ensued, when the usual stimuli were had recourse to, but without any more favourable result. The vapours of oxygen gas were then inhaled in both these cases, and with the most beneficial effect, restoring almost immediately the heat of skin, and increasing the volume of the pulse: an amelioration in all the symptoms followed. The inhalation of the gas was persevered in for four or five hours, and repeated as frequently as the pulse appeared to sink, every application having a decided effect on the circulation."

The utmost sobriety and regularity prevailed throughout this arduous march from Bangalore to Chittoor: all was hilarity and cheerfulness, the men singing as they marched along; and subsequently, although cast down, there was no instance of drunkenness for three weeks. Amidst the appalling scenes arising from so much mortality amongst the men and their

families, it was highly gratifying to observe the propriety with which they conducted themselves. Intoxication, the remedy for all the soldier's grief, was scarcely heard of, so that to this cause the epidemic is not to be attributed.

Remark by Dr. Murray.

" The foregoing Report and Table are truly appalling ; and as the disasters arising from the march of European troops in India may always be traced to obvious causes, it is of the utmost consequence that these causes should be well known, and strongly impressed upon the mind of every individual in the service, from the commander-in-chief down to the private soldier, that every precaution may be taken to avoid them, or counteract their effects as far as possible ; for a few days' serious sickness in an army may defeat the whole design of a campaign."

CHAPTER II.

Observations on Epidemic Cholera, in the 24th Regt. N. I., during its March from Secunderabad to Palaveram in March and April, 1838, by Assistant-Surgeon Lorimer, M.D.

The regiment commenced its march from Secunderabad on the 12th of February, in a healthy state: the weather during the whole of that month was cool and dry, and the corps continued to progress on its march free from epidemic febrile disease. On the morning of the 2d day of March, having got by this time considerably down into the low country, a heavy fall of rain overtook the regiment between the stages "Rumpichirlah" and "Cumulpaud." (The soil in this tract of country is loamy, or what is usually called cotton ground.) Every man and follower got completely drenched. A fall of 9° of temperature immediately followed, while next day a rise of no less than 17° took place.

On the 4th, at Ardinghee, cholera appeared amongst the followers, and on the 8th it attacked the men of the regiment; it continued to affect the corps till the beginning of April, and though not to the usual extent in point of number, fully so in the ratio of mortality attending it, as will be seen by the accompanying table, which includes only those belonging to the regiment who were affected. The mortality amongst the followers attacked, and who were treated in hospital, was very nearly the same; a considerable number of these latter, notwithstanding the means had recourse to by the commanding officer and myself to have every person attacked brought to hospital, refused

to apply for aid, and scarcely one of them survived, shewing the fatal nature of this epidemic.

The means used to check its progress amongst us during the march were, 1st, choosing good and open encamping ground; 2d, taking short daily marches; and, 3d, attending to the supply of good food to the men; and there is reason to believe that these means were attended with some success.

When we approached near to our destination, the disease still being with us, we were ordered to encamp on the Red Hills till it should leave us; we arrived there on the 28th March, and, though the disease increased much in severity and number on the 29th and 30th, its power soon abated, a few straggling cases only occurring after this date; the regiment remained on this ground fifteen days, when being reported healthy we marched and arrived at Madras on the 13th April. The encamping ground on the Red Hills, which the regiment occupied, appears to be well adapted, by its raised and airy site and the dry nature of the soil (laterite), to fulfil the object for which we were sent there.

The exciting cause of this anomalous and most perplexing disease appears still to retain unabated, even in this country the place of its origin, its first deadly power. A perusal of the annexed table will bear but too ample testimony to the truth of this statement; several instances are there recorded, where a stout and strong man sank under its overwhelming power in the short space of twelve hours, unchecked and almost wholly uncontrolled by the power of medicine. In making this observation, I would not be understood to say that medicine possesses no power over this scourge, even though it is known from the statistical accounts of this disease, that a certain and pretty uniform degree of mortality has attended it hitherto in its widely extended diffusion in every part of the world, and under every variety of treatment; for these records also shew that this ratio of mortality is greatly increased when the disease has been uncombated by medicine; and the results of this epidemic will tend to confirm these statements. Of those attacked,

NAME AND AGE.		GENERAL STATEMENT OF EVENTS.				PROGRESS AND CHARACTER OF THE DISEASE.				ABSTRACT OF THE MEDICAL TREATMENT.		
		Date of Admission.	Date of Discharge.	Date of Decease.	Hour of Patient's Death.	Duration of the disease prior to the commencement of treatment.	State of the pulse at the time of admission.	State of the skin at the time of admission.	Appearance of the fist alvine discharge after admission.	Opiate. Quantity of first dose. Tinct. opii.	Opiate. Quantity of first dose. Opium.	No. of ounces of blood drawn.
						Hours.				m.	gr.	
Mooneapah	35	Mar. 8	..	Mar. 9	7½ A.M.	7	Scarcely perceptible..	Cold and clammy...	Congee water	40	0	0
Rungiah	40	„ 12	..	„ 12	7 A.M.	3	Very soft	Cool, not moist	No stool	40	1	3
Syed Esoph	36	„ 12	..	„ 12	12 P.M.	7	Scarcely perceptible..	Cold, moist	No stool	40	0	0
Dawood Khan	7	„ 13	Mar. 18	..	....	2	Very weak	Cool, not moist	Watery, clear	0	½	0
Syed Alley	32	„ 13	..	„ 15	7½ P.M.	6	90, very soft	Cool, not moist	Congee water	30	1	0
Lutchmanah	21	„ 13	„ 18	..	....	3½	86, very soft	Some warmth, not moist	Ditto	0	1	4
Ensign N.	22	„ 13	April 1	..	....	1	86, soft	Natural heat	Ditto	30	0	16
Tatiah	25	„ 14	Mar. 21	..	....	7	Very small	Cold, not moist	Ditto	30	1	0
Goorapah	28	„ 14	..	„ 15	1 P.M.	8	No pulse	Cold, clammy	Ditto	0	1	0
Sheikh Emaum	35	„ 15	„ 21	..	....	1	80, soft	Natural heat	Ditto	0	1	10
Sheikh Emaum	30	„ 15	„ 23	..	....	9½	Scarcely perceptible..	Cold, moist	Ditto	30	1	6
Budeen Khan	35	„ 15	..	„ 16	2½ P.M.	2	Scarcely perceptible..	Cold, clammy	No stool	0	1	0
Mootiah	33	„ 16	..	„ 26	1½ P.M.	1	Very small	Cool, dry	Congee water	0	1	6
Appiah	37	„ 16	„ 21	..	....	..	Frequent, feeble	Cold, dry	Ditto	0	1	0
Kistapen	20	„ 17	„ 29	..	....	3	Very small	Cool, dry	Ditto	30	1	8
Laal Khan	35	„ 17	..	„ 17	8 P.M.	7½	No pulse	Cold, clammy	Ditto	0	1	0
Soobriah	37	„ 17	..	„ 18	10 A.M.	3	No pulse	Cold, clammy	Ditto	40	1	0
Ramasaumy	40	„ 17	..	„ 18	9 A.M.	10	No pulse	Cold, clammy	No stool	0	0	0
Nuransaumy	30	„ 18	„ 25	..	....	2½	Very weak	Cold, not moist	Watery, congee	0	1	6
Veerasaumy	22	„ 18	..	„ 19	2 P.M.	12	No pulse	Cold, clammy	Congee water	0	1	2
Sheikh Emaum	28	„ 18	„ 21	..	....	3	Frequent, soft	Cold, dry	Ditto	30	1	10
Ramasaumy	36	„ 18	..	„ 18	7 P.M.	4	Very soft	Cold, not moist	Ditto	0	1	6
Moonsaumy	40	„ 18	„ 22	..	....	1	88, soft, regular	Moderate heat	Ditto	0	1	12
Mahd. Subdur	30	„ 18	„ 23	..	....	3	Soft, fair strength	Cool, dry	Ditto	30	0	8
Abdul Luteef	38	„ 18	„ 23	..	....	16	No pulse	Cold, not moist	Ditto	0	1	4
Sheikh Hyder	30	„ 19	..	„ 19	1 P.M.	8½	No pulse	Cold, clammy	Only 1 stool, congee water	30	1	0
Mahd. Esoph	45	„ 19	„ 21	..	....	½	68, full, laboured	Moderate heat	Watery, tainted green	0	1	12
Sheikh Hosain	38	„ 20	..	„ 20	12 noon	14½	No pulse	Cold, not moist	Congee water	40	1	5
Soobriah	15	„ 20	..	„ 20	1 P.M.	10½	No pulse	Cold, clammy	Ditto	20	1	1
Sheekh Abdul Nubby	35	„ 22	April 4	..	....	13½	Very small	Cold, not moist	Ditto	20	1	5
Goorapah	40	„ 22	Mar. 28	..	....	1	100, soft, regular	Moderate heat	Ditto	0	1	8
Mahd. Hosain	11	„ 22	..	„ 22	11 A.M.	12	Died on admission	....	....	0	0	0
Sheikh Homed	30	„ 22	„ 28	..	....	7	Scarcely perceptible..	Cold, dry	Congee water	30	1	6
Azmut Khan	35	„ 23	April 5	..	....	4	96, fair strength, regular	Natural heat	Ditto	30	1	8
Sheik Hosan	40	„ 23	..	„ 29	8½ P.M.	3½	Quick, with some strength	Moderate heat	Ditto	30	1	8
Sheik Hosan	20	„ 25	Mar. 28	..	....	6½	108, very weak	Cold, not moist	Ditto	30	1	4
Abdul Kareen	30	„ 26	April 9	..	....	2	90, very soft	Cool, dry	Ditto	30	1	3
Sheikh Emaum	40	„ 27	..	„ 27	3 P.M.	8	No pulse	Cold, clammy	No stool	30	1	0
Bulliah	30	„ 27	..	„ 28	2 P.M.	7	No pulse	Cold, clammy	Congee water	30	1	1½
Syed Sillimaum	34	„ 28	„ 5	..	....	5	Scarcely perceptible..	Cold, not moist	Ditto	0	1	2
Puckrodeen	45	„ 29	..	April 1	3½ P.M.	7	Scarcely perceptible..	Cold	Ditto	0	1	8
Yenkiah	32	„ 29	„ 5	..	....	1½	Very small	Moderate heat	Ditto	0	1	6
Rungiah	17	„ 29	..	Mar. 30	1½ A.M.	1½	Scarcely perceptible..	Moderate heat	Ditto	20	0	6
Ramasaumy	38	„ 29	..	„ 29	12 night	3	Very quick, small	Cool, not moist	One stool only watery	30	1	4
Puckrodeen	44	„ 29	..	April 1	3 P.M.	3	Quick, 100, soft	Moderate heat	Congee water	0	1	0
Rungiah	22	„ 29	„ 2	..	....	2	108, soft, pretty full..	Moderate heat	Ditto	30	1	8
Sheikh Ramsaum	24	„ 30	..	Mar. 30	11½ P.M.	2½	Very small	Cold, not moist	Ditto, very scanty	0	1	2
Sheikh Dawood	44	„ 30	„ 2	..	....	1	86, soft, regular	Moderate heat	Very pale, watery	0	1	0
Puckrooden	30	„ 30	..	„ 30	9½ P.M.	3	No pulse	Cold, clammy	No stool	0	1	1
Sheikh Emaum	37	April 7	„ 13	..	....	2½	Remarkably weak	Moderate heat	Water of a slight green tint	30	1	5
Permalloo	40	„ 29	May 13	..	....	2	Scarcely perceptible..	Cold, moist	Only 1 watery, & very pale	30	1	0

and who refused to apply for aid, between 60 and 70 in number, scarcely one survived; while 26 out of 50 (excluding the boy who died without treatment) of the men belonging to the regiment, and 25 out of 52 cases amongst the followers, recovered under treatment; total number treated 102, deaths 51—exactly one-half, which shews that the treatment has been far from successful. I will not, however, attribute this want of success to the nature of the epidemic, to the inconveniences and disadvantages in the treatment of any acute disease always necessarily existing on a march, seeing that the disease has frequently been as fatal in well regulated hospitals; nor to the late period of the disease at which many of the patients were admitted. Probably they had some effect; but I candidly attribute it to an imperfect knowledge on my own part of the nature and mode of action on the system, of the subtile and mysterious cause of this disease, and the consequent inaptitude, perhaps also inadequacy, of the remedies employed.

The character of the disease will be seen by the table to have been of the low form, and equally fatal throughout the whole period of its continuance, perhaps most so during the last two or three days; differing in this respect from what has usually been observed, viz. that the attacks become milder and less fatal towards its termination.

We shall premise a summary of the symptoms of the disease as it appeared in this epidemic, by giving those of three cases somewhat in detail.

Laal Khan, Sepoy, aged 35. 17th March. Admitted 9 A.M. with purging of watery congee stools, no vomiting; weakness extreme, no pulse; no spasms; skin cold, clammy; aspect of countenance quite collapsed; respiration long protracted, heaving, oppressed; ill 7½ hours.

10 A.M. retained the medicine; no pulse, skin cold, no stool. 12 noon, 4 stools watery fluid, no vomiting, pulse still absent; skin cold; no spasms; can sit up and is constantly tossing about as if in agony, yet says he has no pain; respiration is still oppressed. At 2 P.M. two stools still watery and without colour;

very restless, no pulse, no emesis, no urine, no spasms. After this hour he had no more purging; he gradually sank, exhibiting very little stupor, and died without spasm at 8 P. M.

Puckrodeen, Sepoy, aged 30. 30th March. Admitted 3 P. M. In a very low and collapsed state; purged only twice since 12 noon: pulse is not felt, skin cold, moist; respiration is pretty easy; no spasms; a stout man.

Half-past 5 P. M. Rejected the first dose of medicine (being the first emesis); no stool since admission; the respiration has become greatly oppressed; a small pulse felt at the wrist; venesection now attempted, but scarcely any blood could be got; it was remarkably thick and dark: he had no more purging or vomiting, but sank rapidly and died with long protracted and oppressed heaving respiration, and completely comatose, at half-past 8 P. M. Duration of disease eight and a half hours.

Abdool Kareem, Sepoy, aged 30. 26th March. Admitted 8 A. M. Says he felt well yesterday, and up to 6 A. M. this morning, when he was suddenly seized with great weakness, followed by purging; has had three stools since, the last quite characteristic; his aspect is sunk and collapsed to a degree; has not had vomiting; no spasms; pulse is very soft, 90; no urine passed since an early hour this morning; has been attending on a cholera patient for three days past.

Half-past 9 A. M. Weakness greatly increased, no stool, and no emesis; the respiration has become heaving and oppressed; pulse very small; when preparing to bleed him at this hour he vomited rather largely (being the first emesis); the venesection was performed after the vomiting ceased, but only four ounces of blood could be obtained: it was dark and thick; the pulse, however, improved somewhat by it. 12 noon, only one stool and one emesis since half-past 9 A. M., but is much weaker and more sunk; respiration is again greatly oppressed; stupor to a degree; pulse is remarkably small, venesection repeated; blood of the same character, and nearly four ounces obtained; some relief followed; he again became very low at 2 P. M. with oppressed respiration, had vomited two or three times, but had

purged only once; the emesis abated at 4 P. M., and at that time the skin became a little warm, and the respiration somewhat easier; but it was not till 4 A. M. next morning that a decidedly favourable change took place, and it was three hours after this that the favourable crisis took place; at this hour the report says, " another stool greenish coloured, and has passed some urine; pulse very soft." From this period he recovered rapidly. A sore mouth detained him in hospital till the 9th April.

Symptoms, summary of.—In very few cases were premonitory symptoms observed; these when present were giddiness with a degree of weakness, and precordial uneasiness, preceding two or three hours the vomiting and purging; three or four cases had slight fever for two or three days before the attack. But generally the patient was seized at once with sudden prostration of strength, amounting in several instances to complete syncope, followed by purging; and after two or three evacuations, and perhaps one emesis, the patient was brought to the hospital, generally greatly collapsed, the features of the face having assumed the characteristic aspect of this disease. The emesis but in few instances was urgent, nor was the purging; three or four stools after admission, and often not copious, was generally the extent, the fluid ejected in both ways being characteristic. Along with it, both by stool and by vomiting, the appearance of lumbrici dead was very frequent; a little girl attacked passed at one time by stool upwards of twenty of these worms—she recovered. It was not unfrequently the case that no stool was passed after admission, nor were these patients (one only excepted) affected with vomiting: invariably both the emesis and purging ceased some time before death, when the case was fatal. The pulse was present and variable in character, or absent, according to the time the patient had been ill; exceptions to this remark, however, also occurred; but in every case during the course of the disease it became greatly sunk, scarcely perceptible, and frequently absent altogether for a time. The physical strength of the patient was

greatly depressed, but not always in proportion to the state of the circulation, as examples were seen where the pulse being wholly absent, the patient was able to roll about, nay, even to sit up.

The blood when drawn was generally of a very dark colour and unnatural thick consistence. This state of the blood was not in proportion to the duration of the disease at the time it was withdrawn; and it was equally seen in the cases where the vomiting and purging had scarcely existed as in those where these symptoms had been present, and to a full extent. The head was affected in almost every case, but not with stupor, although in every fatal case the death was partly by *coma*. The affection of the brain existing in this disease is peculiar—a degree of drowsiness, from which the patient is easily roused to give a correct answer to questions, but he soon irresistibly relapses, nor can he answer many questions at one time. The eye was frequently suffused, with a sluggish pupil, often dilated. *Tinnitus aurium* was also a frequent symptom. Spasms were present in four of the cases, and in only one of the cases amongst the followers, in all very slightly marked. The respiration was invariably more or less oppressed during the attack, becoming long protracted and heaving before death; heat and pain at epigastrium were always present, expressed by many as excruciating, with urgent thirst, and combined in a few with a keen sensation of hunger. The secretion of urine was invariably suppressed during the course of the disease, though in some it continued to be secreted in small quantity for the first few hours. The surface gradually lost its temperature and its function, in every case exuding copiously a clear fluid perspiration; and its vitality in every fatal case, some time before death, becoming cold and clammy, the extremities shrivelled and shrunk.

These symptoms varied in duration from nine or ten hours to two days, seldom longer; in some of the fatal cases death took place in the stage of collapse even at this so long protracted period. Some recoveries also took place after this lengthened state

of collapse; but generally the poison had performed its work, or its power was expended, within the twenty-four hours. Again, in several cases, after these symptoms had subsided, the pulse having regained its strength, and the secretions being partially restored, a febrile state, of the continued typhoid character, ensued, marked with severe head symptoms, great stupor amounting to complete coma, with contracted pupil, stertorous breathing, frequent weak pulse, dry loaded brown tongue, great paucity and albuminous state of the urine, of low specific gravity. This febrile state occurred in nine of the cases given in the preceding table; it lasted several days, and it was fatal in four of them, strictly in the way of coma. It also occasionally ensued in the cases amongst the followers, the results proving it to be as fatal a period as the stage of collapse. Ensign N.'s case (the only European attacked) was followed by this febrile state: he happily recovered.

Not having been allowed to make any post-mortem examinations, I cannot follow up this account of the symptoms with the appearances on dissection; and before noticing the cause of this disease I will say a few words concerning the prognosis. At the beginning of the attack, from any observation I was able to make, I could not predict, even in the last instance which occurred, how the case would go for one single hour, much less the ultimate result; but as long as the pulse remained, and when it subsided, if the respiration kept moderately easy, and the skin retained somewhat of its natural feeling and function, I never lost hope; but when the respiration became greatly oppressed, long protracted, and heaving, and along with this the cold clammy state of the skin appeared, the case was hopeless at whatever period of the attack these symptoms took place, and occasionally they appeared very early. The vomiting and purging in general were comparatively easily controlled by the remedies, but when the effects of the poison reached to the above extent no remedy had any effect; and, as a general observation, I should say that the case can never be reckoned safe till the bile appears in the stools and the secretion of urine re-

turns. Neither could I predict with certainty whether the secondary fever would affect the patient or not; it appeared, however, that the chance of his being so affected was in proportion to the severity and protracted duration of the stage of collapse. Attention to the age and constitution of the patient afforded no assistance in predicting the result, except when the patient was under seven years. Eight cases occurred under this age, and seven of these recovered; therefore it would seem to be greatly less fatal at this period; it appears, however, that its effects are not modified by any age above ten, nor by any variety of constitution. The mortality is not much influenced by caste and habit of life: of the number given in the table 22 were Hindoos and 28 Mussulmans; 12 of the former ($54\frac{1}{2}$ per cent.) and 13 of the latter ($46\frac{1}{2}$ per cent.) died.

Causes to which this epidemic may be attributed.—The great and sudden changes of temperature on the 2d and 3d of March (a fall of 9° on the one and a rise of 17° on the other) following the heavy fall of rain on the morning of the 2d, to which the men were exposed when exhausted and fatigued, might act as predisposing causes, and favour the development of the disease when we came to that tract of country known to have been of late frequently affected with this scourge, though it was by report free from it when we passed. The regiment up to the 4th of March might be said to have been perfectly healthy, no case of acute disease having been in hospital; on that day the first case of cholera occurred. Is it to be attributed to those sudden changes in the physical properties of the atmosphere, or, as is now generally believed, to a specific poison (electrical?) generated by and attendant upon these changes? or is it to be ascribed to a lurking poison generated and deposited in these places by persons previously affected with this disease?—in other words, is the exciting cause of this disease a poison of aerial or human origin? This is a question as important as it is difficult to decide upon. If it is to be ascribed to the first, it must be admitted that all the cases which occurred received the poison into their system before the 4th of March, remaining and accu-

mulating there till it produced its effects at various after periods until the date of the occurrence of the last case, for no such changes of the atmosphere were afterwards experienced: this is possible, and it is also probable. If, on the other hand, it is ascribed to the second, the appearance and continuance of the disease amongst us can also readily be explained. In support of this latter opinion, it may be stated in the first place, that the disease appeared first among the followers, and was confined to them for four days. These people, it is known, wander much more from camp about the villages than the sepoys; they perhaps received the poison there, although we could not trace in one of these first cases actual contact with a person affected. Instances, however, soon became frequent, where those in contact with the affected were attacked, and in a proportion manifestly greater than those who avoided such intercourse, so much so that the belief of its possessing a contagious property was forced upon me. It was so in Mr. N.'s case, in three of my own servants, in two of Mr. Young's servants, in three of the public bearers, in one of the hospital toties, in one pakally, in several of the hospital patients, and in a peculiarly striking case, where the first, second, and the third attendant were attacked in rotation, and in a manner at the bedside of the patient. When it appeared in a family, generally two, three, or four cases occurred. And lastly, almost all those cases which happened on the 29th and 30th of March had lost a relative from this disease on the road: these persons might have received the poison then, or when unpacking the bandies where the persons died.

It appears to me no objection to the supposition of the contagious nature of this disease that many of those who had free intercourse with the sick were not affected; the same is observed in other diseases possessing acknowledged contagious properties, for example, plague, small-pox, typhous fever. Persons have been known to have closely attended upon the two latter, more particularly the last, for one, two, and even three years, before the disease was communicated. In ascribing to this disease, therefore, a contagious property, I admit that the contagious poison

arising from those affected is governed by laws greatly different from those which regulate the diffusion of that of other contagious diseases, and that its action, even on those the most fully exposed to it, must be very much dependent on other circumstances in their situation. What these are I have not been able to make one positive observation, except that fear and dread of the disease and an insufficient quantity of food appeared to favour its action. Several instances occurred in persons who had been closely attending a patient for twenty-four or forty-eight hours; the attack in these cases was not more severe than in others where a comparatively transient intercourse had taken place. From this observation it is inferred that the effects of this poison appear to bear no proportion to the quantity which might be supposed to have entered the system, and that it is irregular in its agency.

Having candidly given this opinion obtained from observation, it is stated with due deference to the many and high authorities opposed to it. I am not prepared, however, to state that this is the only mode by which it extends itself: although it appears more reasonable to ascribe it to one than to two specific causes, it may have another mode of extending itself not yet understood. To dwell on this subject would lead to a long discussion not to be permitted here; we should have to trace the disease to its first origin, and follow it to the several countries into which it has recently been introduced, and its course there.

Nature of the exciting cause.—Whatever may be its nature, the history of the disease shows it to be local and temporary in its duration; and of its properties, further than has been already mentioned, I am ignorant. The assemblage of symptoms formerly enumerated are ascribed to it as its specific effects, just as the specific diseases, plague, small-pox, &c. are attributed to their particular cause, a specific poison.

Mode of action on the system, or nature of this disease.—Analogous to what takes place in other contagious diseases, and in those from other specific causes, we will suppose that

the poison enters the system by the lungs, and that it continues to circulate for a time in the system, (duration of this latent period uncertain,) perhaps accumulating, till its effects break forth almost simultaneously on the nervous system, on the vitality of the blood, and on the power of the heart and arteries. The primary and premonitory symptoms of the disease (when observed) show that derangement in the nervous system precedes the others, and indicate the action of a depressing poison: these are, weakness, vertigo, syncope, or tendency to it; the blood at the same time, or soon after, becomes morbid; the patient who was bled thirty minutes after the first symptom appeared, showed the blood, even in this short period of time, to have changed "dark, thick," and the heart's action sinks: this latter may be partly the effect of the altered condition of the blood. The depressed action of the heart and the dark thick state of the blood are not wholly referable to or dependent upon the amount of the evacuations, as they are seen too early, and even in cases where little purging and vomiting have existed, as has been shown by the case of sepoy Puckrodeen (page 38). The increase in this dark and morbid state of the blood, which takes place during the course of the disease, may be in part attributed to the imperfect manner the function of respiration is performed, for this function soon becomes implicated in the struggle, and complicates more the disease. The depressed state of the action of the heart renders it unable to propel the blood, changed as it is to a morbid state, through the lungs; and, consequent thereon, congestion to a great extent takes place in these organs, and from the same cause in the neighbouring feeding parts, viz. in the liver and large venous trunks in the abdomen,* to which congestion may be attributed the epigastric pain and heat, as also in part, but chiefly to a loss or partial

* I witnessed three *post-mortem* examinations of this disease at Secunderabad; the right side of the heart and large feeding veins were greatly distended with dark blood uncoagulated; left side also distended, but not to the same extent, blood dark and loosely coagulated; lungs, as also liver, remarkably congested.

loss of vitality in the capillary vessels on the surface of the body and on the mucous membrane of the bowels, (an effect of the morbid state of the nervous system?) the exudation of the clear serous fluid from these parts. The secretions of bile and urine are suppressed—is this a primary effect of the poison, or dependent also on the deranged state of the nervous system? The degree of stupor and comatose termination seen in this disease, are they to be ascribed to the suppressed state of these secretions? Were it shown that the bile and urea existed in the blood of cholera patients in the stage of collapse, we should certainly be led to ascribe much of this state to this cause. It is known that these two substances are formed in the blood at a part remote from the glands which separate them, but it is probable that the blood is so much changed in this disease that the formation of bile and of urea cannot take place. To what shall we attribute the spasms of the voluntary muscles exhibited in only four of these cases? Uncertain. And the cold state of the surface, is this to be ascribed to the depressed state of the circulation or to partial loss of vitality? And if to one or other of these, how is the fact of the surface of the body frequently becoming warm immediately before and even after death to be explained? Is the secondary fever a direct effect of the poison? or does it arise from a natural reaction, modified by the remedies that may have been given? or is it the effect of the deranged state of the excretions of bile and urea which follows the first effect of the poison? This last appears most probable, and I should attribute much of the great degree of stupor seen in this stage to the deranged state and partially continued suppression of these excretions.

We will now say a few words on the TREATMENT, and first of the disease when fully formed. In the absence of any known remedy possessing the power of counteracting or checking its course, the remedies were applied and given with the view of upholding the strength of the system, and staying somewhat the power of the poison till its temporary effects should cease. According to this view the class of stimulating remedies being

indicated were employed. After making this statement, it may excite surprise to observe that the lancet was so often used in a state of the system which would appear to forbid its use; but the effects of this measure have been so satisfactory in aiding and assisting the action of stimulants that I am inclined to notice its use first. In the several cases which first occurred, seeing that stimulants alone failed in keeping up the weakened state of the circulation and supporting the action of the heart, and knowing that the blood was in a very morbid state in this disease, and having heard of the good effects of this measure, I had the less hesitation in having recourse to it. Its effects were decidedly advantageous in very many of the cases in which it was practised: it relieved the system of some of the blood by which the heart is in part so much oppressed, facilitating thus the action of the stimulants, and enabling them to produce their effect; it was only in this view and for this purpose that venesection was employed at this period of the disease. The blood, as already noticed, was dark and thick, very often losing to a certain extent, during its flow, these two characters, becoming partially of a reddish colour and of less consistence. The quantity drawn was regulated by its effects on the respiration and on the pulse; the small amount of six ounces, or even four, was often sufficient to relieve in some measure the oppressed heart, and then the stimulants given at the same time kept up the advantage. The patient was bled generally in the recumbent position to prevent syncope and to favour the flow of blood: more than one death took place by the patient suddenly raising himself up, inducing instant and fatal syncope in this weakened state of the circulation. Generally less than eight ounces gave the desired relief, nor was it thought prudent ever to extract more than twelve, (except in the case of Ensign N.,) dreading syncope. It was practised often at a late period of the disease, and occasionally it was repeated in these small quantities with good effect. It was had recourse to in 34 of the 51 cases given in the table, 21 of whom recovered and 13 died; in 17 it was not performed, and of these only 5 reco-

vered and 12 died. The average number of ounces drawn from the 21 who recovered was eight; in the 13 who died four; and excluding the quantity drawn from three of this number who got over the stage of collapse and died from the secondary fever, the average quantity in these 10 is reduced to three ounces. This statement is thought to afford clear evidence of the good effects of this measure; and though in many it was found insufficient, and failed in giving the desired relief, I give it as my opinion that it is one of the best remedies we at present possess in the treatment of this disease as it appeared in this epidemic. And farther, were I called upon again to treat the same form of the disease, I would not hesitate to have recourse to it in every case and at any period of this stage of collapse, prior to the appearance of the cold clammy state of the skin, (and even when this fatal symptom was present, I have seen it prolong life,) and would endeavour by every means to remove a portion of this morbid blood from the oppressed heart, whereby to enable the stimulants to act. The average duration of the disease prior to the commencement of treatment in the 21 cases who were bled and recovered, was $4\frac{1}{4}$ hours, and in the 10 who died 6 hours,—a difference perhaps not so great as might have been expected; but in this disease even one hour produces great changes, and it is but reasonable to suppose that it would have been more successful had all these cases come under treatment within the fourth hour. The average duration of the disease before admission in those who were not bled and who died, was seven hours, while that of the four who recovered without this measure, was scarcely three hours; this shews also the great advantages of early treatment in this disease. But it must be observed that instances not unfrequently occur where the effects of the poison, even within the second hour, have been so great, the power of the heart has become so sunk, and the blood so changed, that venesection conjoined with other remedies fails in relieving the clogged state of the circulation. In several of the 10 cases above noticed this was the case; the blood slowly fell from the arm in large viscid drops, and did not

exhibit the property of coagulation, while in most of those who recovered it exhibited this property, though in a very imperfect state.

Before and after the time this measure was had recourse to, stimulants were prescribed; these were spiritus ammon. aromaticus, spiritus ætheris nitrosi, and æther sulphuricus, given singly or combined. The dose when given separately was min. xx or min. xxx; when conjoined, min. x or min. xij, and repeated every hour or half-hour, or every hour and a half, according to the urgency of the case. The preference was given to the two first for continued use, as their effect is more permanent; the latter appeared, however, to give a more powerful immediate stimulus, though very temporary; but its acrid effect on the fauces and epiglottis forbids its continued use. The vehicle in which they were exhibited was congee rice when it could be obtained; occasionally with a small quantity of arrack or brandy, and generally with one of these before and during a march.

Carbonate of ammonia was also occasionally used in the very low cases, dose grs. iij or iv, with one or two grains of camphor, and four or six of calomel; but though exhibited in the form of soft pills always freshly made up, it produced but little effect. This may have arisen, partly from the very low nature of the cases in which it was used, and partly also from its having lost, by long keeping, much of its stimulating properties; for I am inclined to give to this medicine, from former experience, a high rank, perhaps the first, in the class of diffusible stimulants.

Camphor, another stimulant, was also employed, and to a considerable extent. It appeared valuable not only as a stimulant, but also in allaying the symptom of vomiting; it was given in gr. i or ij doses, along with calomel, hyoscyamus extract, sometimes conjoined with sulphate of quinine, and the carbonate of ammonia. It was also found very useful in abating singultus, which not unfrequently affected the patient after the stage of collapse was over, and for this purpose it was

conjoined with a few grains of blue pill and a small quantity of extract of hyoscyamus.

Opium was but sparingly used. It was given at the commencement of the treatment, and chiefly with the view to assist in allaying the symptom of vomiting; nor was it judged prudent to give it in large doses for this purpose; min. xxx of the tincture and grs. i or ij of solid opium was generally the extent. The continuation of its use as a stimulant appears to me very questionable, from the known narcotic effect which follows its action; and the more especially when we reflect on the great tendency to stupor and coma seen in this disease. It was therefore withheld, and those possessing more unequivocal stimulating properties given.

The last stimulant to be mentioned is the sulphate of quinine. I am inclined to think very favourably of its effects. It appeared occasionally to aid in checking the emesis, and also to have considerable power in this disease as a stimulant; but whether it has the property of checking in any degree the power of this poison on the system is doubtful to me, having in no single instance trusted to it alone. Should the disease again present itself to me, I would give this medicine a trial with this view. Its known powerful effects on the nervous system would justify its exhibition for this purpose, and it appears not unreasonable to suppose that it may have the power of counteracting the effects of this depressing poison by its stimulating properties. In the present cases it was given in doses of grs. iij, iv, and v, combined with calomel, camphor, and carbonate of ammonia; but with the view now mentioned I would give it in gr. x doses every hour or half-hour to the third or fourth time.

The only other remedy used internally was mercury. It was exhibited during this stage, not with the idea that it possesses any power over the action of this poison, but partly to assist in abating the emesis, and that it should be present ready to act in restoring the secretion of the liver, perhaps also that of the kidney, immediately the temporary power of the poison

should cease; and then it appeared also beneficial in giving the desirable purgative action. This medicine was given during this stage, and for these purposes; but when grs. xxx of calomel were retained on the stomach, this quantity was thought sufficient, and it was then laid aside. The dose was generally grs. x with one grain of opium, repeated once, and then smaller doses, with the medicines already noticed. From this quantity the mouth very often became affected almost immediately after the symptoms of the disease disappeared, and occasionally to a severe extent, and large quantities of dark vitiated bile were also passed at that time. Was this copious secretion and discharge of bile an effect of the calomel? Not having been permitted to make any post-mortem examinations, I cannot answer this question.

Stimulating enemata were also occasionally used in very low cases as a last resource; they consisted of turpentine, arrack, spirit. æth. nitros., &c. &c. In the cases in which they were employed they had no effect; very often they were retained, the patient not being sensible of their presence.

In almost every case a blister was applied to the lower part of the breast and epigastrium, partly for its stimulating effect, and partly also as a means of relieving the congestion in the lungs, liver, &c. &c. Its action was often facilitated by placing a very warm cataplasm over it. Sinapisms were sometimes applied to the breast and to the extremities. Both these remedies appeared to be very useful.

Frictions were seldom or never used, the situation the patient was placed in being unfavourable for their employment; and feeling convinced that the uncovering of the patient in the tent did more harm than the friction was calculated to do good, the measure was laid aside.

During the course of the disease it was thought proper to appease the longing desire for water by giving small quantities of congee. A little arrack or brandy was frequently added to it; and so far from doing harm, this indulgence was thought to be beneficial by the temporary relief it gave to the patient's

feelings, quieting his incessant cravings and exertions for the fluid; and his strength was in some measure husbanded by it. Nor was it ever observed that these small quantities of congee increased the vomiting.

The strength of the system having by the above means been kept up during the temporary action of the poison, and the symptoms having disappeared, the after treatment is simple; a gentle purgative, with a mild diet for a day or two, and some tonic medicine, is all that is required. The system, in general, soon returns to its former state; but occasionally, as has been already noticed, fever ensues, with marked head symptoms. The treatment here was pursued according to general principles, paying particular regard to the head. The lancet was again used; leeches were applied to the temples, or the temporal artery was opened when they could not be had; blisters to the nape of the neck, and cold lotions to the head. Free purging was also employed, and it was thought also necessary to resume mercury in these cases, not only as an antiphlogistic remedy, but also to obtain by it a restoration of the deranged secretions to their natural state, with which derangement, as already noticed, it is thought that this fever is intimately connected.

It is thought proper, in closing these remarks, to give an abstract of two cases.

Case 1. *Veerasaumy, Sepoy, aged* 22. 18th March, admitted 4 A. M. greatly collapsed; aspect sunk, no pulse, skin cold, clammy; no spasms; has been frequently purged, and has vomited several times during the last twelve hours, the fluid ejected both ways being characteristic; his mother and sister died yesterday from the same disease; took calomel grs. x, opii gr. i; and some time after tinct. opii, sp. æth. nitros., of each min. xxx. 7 A. M.—Continues in the same low state; pulse still absent, with oppressed respiration; no return of vomiting or purging; min. xv of sp. æth. nitros. were given, and venesection attempted, but only two ounces of blood fell from the arm in viscid drops; although the draught was repeated three times in thirty minutes, no relief was obtained; min. xxx of sp. æth. nitros. in a little brandy and water were given, and he was sent forward on the march. He had, after reaching the camp, repeated doses of stimulants; calomel, with sulphate of quinine and camphor, &c.; arrack enemata were exhibited, but very little or no effect was produced; he had scarcely any purging, except what might have been the effect of the first

enema, and did not vomit once; the respiration became heaving and greatly oppressed; he lingered, however, till 2 P. M. of the 19th, having lived thirty-four hours without a pulse.

Case 2. *Sheik Homed, Sepoy, aged* 30. 22nd March, admitted 9 P. M.; has been purged very frequently, and vomited several times during the last seven hours, and felt a great weakness come over him some time before admission; just now aspect of countenance collapsed to an extreme degree; skin cold but dry; pulse scarcely perceptible; he yawns frequently with long sighing respiration, and complains of pain and heat at epigastrium; is not much affected with stupor; his friends say he has had fever for the last four days, and that his bowels were rather loose during yesterday and the day before.

Venesection attempted and about six ounces were obtained, very dark and thick at first, but changing somewhat to a partially red colour and less consistence, and with much relief to epigastric pain and heat; took then calomel grs. x, opii gr. i, and a little while after min. xxx tinct. opii, and min. xx sp. ammon. arom. in form of a draught: blister to epigastrium 5 × 4.—11 P.M. does well; retained the medicine; two stools, watery, not copious; pulse is better felt than on admission. To take calomel grs. x, sulph. quin. grs. iv, camph. gr. i, and ext. hyoscyam. gr. i. The report at 12 midnight says, keeps up pretty well, no vomiting, one scanty dejection; sp. ammon. arom., sp. æth. nit. aa. min. x every hour to the third time.—23rd, 3½ A. M. Has become remarkably low, having got only one of the draughts since last report (the attendant having slept); no pulse; skin cold but not moist; to have calomel grs. v, sulph. quin. grs. iv, camphor. grs. ij immediately, along with the stimulating draught.—5 A. M. pulse again felt, no stool and no vomiting; says he feels pretty easy, and skin, though cold, keeps free from moisture; pills to be repeated, and draught with a little brandy. His pulse kept up after this, but it was not till 4 P. M. that a favourable change took place, and 8 P. M. that the decided crisis occurred. The report at the former hour: took the pill (pil. hydrarg. grs. v, camphor. gr. i, hyoscyam. gr. i,) and congee with arrack as ordered; one stool, dark-coloured, copious; feels very easy; no urine passed. At 8 P. M. another stool, dark-coloured; pulse of fair strength; skin of moderate heat, with a warm moisture on breast; has passed some urine; he recovered rapidly after this under the mild treatment formerly mentioned, and was discharged quite well on the 28th March.

I shall give the detail of one case to illustrate the treatment of the disease in the early stage, before it is fully formed.

Case. Mahomed Esoph, Havildar, aged 45. 19th March, admitted 5 P. M. with the cholera aspect pretty well marked; *great weakness;* pulse 68, pretty full, but labouring; skin, moderate heat, dry; no cramps; feels easy by account, but the respiration is somewhat oppressed, and he appears uneasy;

has been purged three times during the last half hour, last stool watery; has not vomited; a stout made man; a patient in hospital with dracunculus. He was instantly bled to oz. xij. The blood at first was thick and dark, but became natural; the pulse rose to 90 and became soft; the respiration was relieved; he said he felt quite well after the bleeding; took then calomel grs. x, opii gr. i. —8½ P. M. no stool, no vomiting; feels very easy; pulse natural in frequency, and of good strength. To have congee oz. viii, with arrack, for a gruel.—20th, slept well; no stool; pulse calm, tongue moist, skin natural: ol. ricini ʒ vi, tinct. rhei ʒ ii.—Vespere, two stools, rather dark, bilious; feels comfortable. Nil.—21st, well, discharged.

The effect of the bleeding in this case was very satisfactory, though it may not be easy to explain how it operated. It appeared to relieve the oppressed state of the nervous system, and thereby broke the catenation of the morbid effects closely impending; the heart's action became more free, the respiration was instantly relieved, the beginning congestion in the lungs being checked, and the weakness which he complained of disappeared. Unfortunately, very few cases presented themselves at this early period of the disease, only three more of the whole number treated, where it was thought advisable to adopt this measure, partly with the view of checking the course of the disease. In these three the effects were not so striking as in the above case, but the stage of collapse scarcely appeared in two, and it was very moderate in the other one. Measures were taken to prevent this delay on the part of the patient in reporting himself, but in this disease very frequently the patient shows a great unwillingness to think himself affected by it, often appears anxious to conceal it, till the sinking sensation of collapse overtakes him and compels him to apply for aid.

But even when the disease is early presented for treatment, the vast mortality which attends it (perhaps necessarily) is but too well known; therefore the great importance of prophylactic measures against its attack. Those that were had recourse to in the present instance have been mentioned, and I will merely allude to the second before concluding. From the view given of the mode by which the disease extends itself, the measure

of taking short daily marches was adopted, to prevent the accumulation of this cause, and chiefly to it is attributed the unusual small number of attacks. There can be no doubt that in a standing camp the treatment is more advantageously, perhaps more successfully, because more regularly applied; but the diminished number of attacks from the daily changing of the ground, I am firmly of opinion, greatly counterbalances the necessary evils and disadvantages attending the treatment of the disease in a moving corps, by giving a proportionally less amount of mortality in the end.

CHAPTER III.

On Choleroid Disease at Sea, by J. Sutherland, Esq. Surgeon of the Ship Claudine.

On the 12th of February, 1839, the ship *Claudine*, in latitude 3° 12 north, and in longitude 21° 50 west, on her passage from London to Madras, passed at 8 p. m. through a sea observed to be crowded with phosphorescent bodies, which emitted a brilliant light when agitated—as in the wake of the ship. Large fields of light, many acres in extent, were seen in all directions, the surrounding water looking dark by contrast; the wind was light, the sea very smooth, and the evening had been close and sultry. Shortly after this, William Hill, cuddy servant, was attacked with vomiting and purging, accompanied with distressing griping: the matters passed were similar to those voided in Asiatic cholera. The pulse was not sensibly affected; skin of natural temperature and covered with moisture; abdomen free from pain on pressure. About the same time I was attacked with dreadful tormina, alternating with vomiting and purging, after which I was relieved. At 12 p. m. I called on Mr. A., and was surprised to find that he was in the same state as myself; and he complained most of great prostration of strength and a disposition to fainting. Brandy and opium were administered without much relief, but frictions and fomentation with warm water gave considerable ease; and I found an enema with forty drops of opium most effectual in relieving the symptoms.

While we were thus under treatment another case was re-

ported, a cadet of spare habit, who had enjoyed good health previously. He was relieved in a few hours by the same treatment. Some other cases less severe occurred about the same time.

On the following evening four more persons were attacked: in two the symptoms were as severe as those mentioned, and in one spasm of the limbs was a marked symptom.

The early stage of the disease was treated as the former cases; and calomel and opium were afterwards given, followed by castor-oil or a saline purgative on the following morning, and all the patients recovered in a few days. On the third night there were a few more complained, but their symptoms were not of a serious nature.

It will be seen by reference to the map of Africa that we were 500 miles from the nearest land, and about 700 from the coast, in the direction the wind was then blowing, viz. N. N. E.—the direction of the Gambia river.

A question arises from the facts stated, what was the cause of the disease which affected so many people simultaneously? That it was not produced by error in diet was inferred from its having affected persons in several situations on board, who consequently take different kinds of food, &c. &c.; nor does it seem to have arisen from sudden change of climate, by which the biliary and digestive organs could have been affected; nor from any state of the atmosphere which could be discovered by the barometer or thermometer.

I am not aware what causes have been observed to produce a disease like the present, which is seen to differ from what is called English cholera by the absence of bile in the excretions.

We are led to the necessity of acknowledging the existence of an epidemic influence in the production of the cases, but whence its origin at so great a distance from land in a well regulated and properly ventilated ship? The occurrence of any such disease affecting a large number of the crew is unusual, except in a port (or shortly after leaving land) where they have been exposed to some endemic or epidemic influence.

From the above statement it may be supposed that the disease arose from decayed animal or vegetable matter, acted upon powerfully by a vertical sun, assisted by the perfect calms which often prevail in that latitude, during which the water on the surface of the sea may become putrid.

The only other source from which malaria could be derived was the African coast, but at a distance of 700 miles it is difficult to conceive its influence could have reached; and even if it was admitted that this was sufficient for the production of the disease in question, it will remain to be proved whether symptoms like the present exist in the diseases of the coast of Africa.

From the facts adduced it appears,—

1st. That the disease is not the effect of sudden change of temperature, climate, or errors in diet.

2d. That an epidemic influence existed in the atmosphere as the source of the disease.

3d. That this state of the atmosphere did not appear to depend upon effluvia wafted by the prevailing wind from the coast.

4th. That the disease was produced by the decomposition of floating organized matter.

5th. That there is good reason to believe that this decomposition took place from causes already explained, viz. stagnation of the surface of the sea charged with animal or vegetable matter, exposed to a vertical sun.

6th. That the ship passed through a part of the sea where these causes were in powerful operation.*

* If the attacks of illness here recorded had any origin independent of errors of diet, could they have been produced from the impregnation of the waters of the western coast of Africa with sulphuretted hydrogen, to which Mr. Daniel shewed that the rapid decay of the copper of ships' bottoms in those seas was to be attributed; and of which he remarks, "nothing more is wanting to identify the cause of rapid decay of ship's copper with that of the mortality of the climate?"—*Editor.*

CHAPTER IV.

Special Report on Cholera, as it affected Her Majesty's 39th Regiment at Bellary, during the months of March, April, and May, 1839.—By J. Macgregor, Esq., Assistant-Surgeon, H. M. 39th Foot.

In detailing the extent of the recent attack of cholera which pressed so heavily on Her Majesty's 39th regiment, I have to solicit some indulgence in the performance of the task, more especially as the absence of the senior assistant who held the prominent charge of the cases, and who could have more fully and satisfactorily detailed the circumstances attending it, has imposed the execution of this duty upon me.

Moreover, this epidemic or endemic visitation was the first I ever met, and in that respect I had no experience of previous attacks to fall back upon, either to guide me in my practice or to form a contrast with what was passing before me.

An acquaintance with the general history of the disease, and some theoretical ideas founded closely on the experimental deductions of Stevens and O'Shaughnessy, formed the qualifications with which I was hastily called upon to encounter its active operations.

I was rather biassed in favour of the chemical theories, and leaned a good deal to the hope that saline treatment, whether by hot enemata or by drinks, would effect some improvement in the result. The experience of cold affusion in Persia had attracted my attention, in consequence of recent agitation of the pathology of the disease in the Madras newspapers, and a

contrast between the Persian and European practices led me to anticipate great benefit from its use.

We practised with great industry the general bathing, and the local affusion of the head, and sometimes saw from their employment, especially in the less intense instances, a decided improvement in the features of the disease. Bleeding was handed down as a disputed point, and though beneficial in the mild cases of cholera, in reality I can only still pronounce it a doubtful remedy, in as far as respects predication of the result.

In the progress of the epidemic, or perhaps more properly endemic, we had recourse to a mixed treatment, composed of calomel, opium, and tartar emetic, in small and frequent doses, conjoined with hot saline enemata, bathing, powerful counter-stimulation over the epigastrium, and bloodletting. Towards the end of April, Dr. Graves's pills were strongly recommended for trial in a letter from the Director-General of H.M.'s Medical Department, and following the directions of Dr. Graves, we administered them in a good many instances.

There are so many contending systems of treatment, vying with the common routinal one of calomel and opium, which claimed our attention, and they were nearly all tried; but the monster cholera maintained its usual virulence, and stood its ground in spite of the sap and assault with which these opponents pressed on to the rescue.

Of those attacked, about one-half fell victims to it. The average numerical strength of the regiment was 675 men, 38 officers, 68 women, and 104 children; and out of this number 72 cases of cholera are recorded among the men, one among the officers, nine among the women, and seven among the children.

By subtracting the cases which were choleroid, (or cholera in the doubtful premonitory stage,) it may be said that only 55 cases of fully formed cholera occurred among the men, of which 29 died. Among the officers the only one seized died: seven true cases of cholera occurred among the women, of whom five died. The seven cases among the children were fatal without any exception.

	Total Cholera.	Died.	Per Cent.
Men........	55	29	51.8
Officers	1	1	100
Women	7	5	71
Children	7	7	100

Now it will be confessed by all who witnessed the exertions of Dr. Davis in hospital, that no one could have been more unremitting or enthusiastically ardent in his attention, while nothing could have surpassed the frequency and regularity with which the remedies were administered; and yet we can boast of no greater success than what appears above!

With all our reasonings I do not see that we have advanced much further in the pathology of cholera than was known at a very early period. In fact the modern rationale, exclusive of the humoral discoveries, seems only a reiteration of what was promulgated with more or less comprehensiveness soon after the first appearance of the disease; and resembles it in holding the high and misty places of generalization on the relative impression which the morbific agent makes on the nervous system and the blood.

In so far as the nervous centres are concerned, it is generally understood that the sympathetic suffers the impression more prominently than the cerebro-spinal axis in the early stages of the disease, and so far affords an indication for avoiding all severe applications to the spine, head, or nucha, as unnecessary, since little good can be expected from such torment; while, on the other hand, we are induced to place reliance on stimulant applications and *alterant douches*, which serve to rouse the sympathies generally; and among them to estimate highly the dash of cold water on the head, and strong counter-irritation over the epigastrium.

In the stage of reaction attended with comatose oppression of the cerebro-spinal system, the line of treatment must be changed, as different indications then present themselves. The heart is relieved from the morbific influence and has responded by elastically rising in vigour, resuming its power, and performing with

more regularity its contractions in proportion as the depression of the general sensibility and irritability wears off.

To account for such alterations is, in the present state of our knowledge, impossible, and consequently need not entail unnecessary hypotheses, which, however specious, resolve themselves into so many words—*et præterea nil.*

It may be assumed on turning our attention to the circulating system, that no one will deny that the blood presents extraordinary alterations, and in fact that the morbid changes observed in this disease are nearly all confined to the fluids.

But whether the morbific agent acts directly on the fluids by decomposing and corrupting them, and the altered fluids afterwards affect the nervous system, or *vice versâ,* we have no means of ascertaining.

The reasoning on this point proceeds in a circle, by following the course of which, the facts and results may be explained theoretically in inverse directions. The difficulty is to get the first link of the morbid chain—the proper point from which to start.

If the theories leave out of view the alterations in the fluids both in composition and quantity, it is evident that no greater fault can be committed.

The dark colour of the blood was early perceived, with its tenacity, oiliness, and disorganized condition. Stevens showed that much of the colour of blood in general depends on its salts. O'Shaughnessy showed a deficiency of the saline ingredients in cholera, and of the watery part or serosity ; and that the remnant was a thick and condensed mass. Carrying this view out to its full extent, it follows, I think, that the quantity of circulating fluid is greatly diminished, and that the loss of bulk may be one-fifth or one-fourth, or even one-third, relatively, according to circumstances.

This consideration may explain why bloodletting is so precarious, why debilitated subjects and convalescents from diseases in which the blood has been placed in an abnormal condition as to proportion of serum and clot, and also as to the solubility or coagulability of the fibrine, suffer so severely.

This view I think I saw confirmed in dissection. The lungs of the debilitated subjects were collapsed, and of course contained thin choleraic blood, but were not distended by it; while in the more robust the lungs were of full volume, and contained an engorging quantity of blood. Hence a mechanical distinction to guide as to depletion.

The stoppage of the secretions attracted attention, but the deductions from this were not placed in a prominent point of view, and perhaps rightly, as there were no sufficient facts on which to found a consistent theory.

Experiment has detected urea in the blood and in the alvine evacuations, but none in the urine, which early was shewn to be almost suppressed, and when present to be acid, albuminous, and scanty. The sweat seems to be acid, and so are vomited matters; but experiment says not whether urea or any other unusual matter is present in them.

The bile is not poured into the intestines, though dissection shows the gall bladder to be full of green bile, the retention of which may act injuriously; but *how*, neither experience nor theory shews.

In the favourable crisis, coetaneous with the elastically rising pulse, the bile flows, and is frequently vomited, especially when tartar emetic is given in combination with calomel and opium, and when acet. plumbi and opium are administered according to the directions of Dr. Graves, but this escape of the bile is not a certain indication of recovery. The appearance of the urine in any quantity, more especially if freed from albumen and containing urea, is a greater mark of safety; which, as it is the last secretion in returning, may be said to be critical of whether recovery is to take place, or comatose reaction or relapse is to ensue.

It also becomes a question to ascertain how far the urea, which is proved to remain in the blood, operates in inducing, aggravating, or completing the coma in reaction. That it does not act alone seems evident from the slowness of its operation in ordinary ischuria, Bright's disease of the kidneys, &c.

In this question it is immaterial whether the retention of the

urea or its vicarious discharge is the cause or effect of the choleraic condition, if it is probable that its presence in the blood cooperates with other unknown or undetermined agencies to bring about the undesirable coma which is confessedly so dangerous.

How far the other secretions of the body conjoin to produce any of the morbid effects is also matter of speculation.

The dissolved (disorganized) state of the blood is a most curious circumstance; but the mode and the steps by which this is effected are hidden in mystery.

Majendie has lately put forth a list of substances which prevent the coagulability of the blood, and of those which favour it, as follows:—

Substances which promote the coagulability of the blood.

Water.
Sugared water.
Muriate of soda.
Muriate of potash.
Muriate of ammonia.
Muriate of baryta.
Serum of ascites.
Boric acid.
Borax.
Nitrate of silver.
Hydrosulphate of potash and ammonia.
Seltzer water.
Vichy water.
Seidlitz water.
Ioduret of potassium.
Tartrate of antimony and potassa.
Sulphate of magnesia.
Alcohol.
Cyanuret of gold.
 do. of mercury.
Acetate of morphia.
Hydrochlorate of do.
Mannite.

Substances which oppose the coagulation of the blood.

Acid sulphuric.
 do. hydrochloric.
 do. nitric.
 do. tartaric.
 do. oxalic.
 do. citric.
 do. lactic.
 do. acetic.
 do. tannic.
 do. hydrocyanic.
Soda.
Potassa.
Lime.
Ammonia.
Carbonate of soda.
 do. potassa.
 do. ammonia.
Nitrate of potassa.
 do. lime.
 do. strychnia.
Sulphate of morphia.
Nicotine.
Putrid water.

This table is very important, liable, however, as it is to the objection that the experiments were made on blood in a normal state.

Such experiments tend to correct many notions, and, with all their imperfections, may lead to good. It is curious that many of the substances in the first list have enjoyed a reputation of giving relief in cholera, and that in the second list we see citric acid, which is well known to be the antidote of the abnormal state of the blood in scurvy.

The action of putrid water resembled closely the symptoms of yellow fever, and Majendie thinks it proved that putrid exhalations inspired or absorbed have a power of dissolving the blood.

The idea is good, but the cause which dissolves the blood in fevers cannot be the agent which does so in cholera, as an additional phenomenon comes into play, namely, the emission of the serosity and the salts of the blood, which either by imbibition or simple filtration pass away through the internal and external mucous membranes.

This decomposition has called forth speculations on the influence of electricity in the generation of this disease. But if electricity does interfere, it must be some variety of it, or some electro-magnetic influence, which obeys laws different from those of common electricity. It appears to have attractions to certain localities, or animal states to which we have not hitherto obtained a clue. It cannot be the common aerial or terrestrial electricity, as *it* causes only a simple dissolution *(solution)* of the blood, not a decomposition and separation of its component proximate principles, while it destroys simultaneously the influence of the sympathetic and cerebro-spinal systems of nerves, causing apoplexy or paralysis when it fails to destroy instantaneously the irritability of the heart.

Having thus given my profession of faith, I hesitate in adopting any theory as complete, and join the majority of medical men who rest on their oars, waiting patiently for the results which the study of the humoral pathology is gradually making in illustration of the changes induced in the blood by the choleraic agent.

But while it is confessed that barely one-half of severe cases have been recovered after the agent has spread its snares around its victims, I am one of those who consider that, if cholera cannot be always cured, *it may be avoided*, and will endeavour in the following detail to shew that, according to a very prominent feature in this disease, it selects certain places in preference to others, and that one of its favourite resorts is in a circle, of variable extent, around certain rocks at Bellary, more especially in the lower fort in which the barracks of the Royal Regiment are placed.

It is not denied that cholera visits or may visit any locality, and may occasionally commit great ravages in places to which it was completely a stranger; but there certainly are strong grounds for thinking some places more favourable to it than others, and the lower fort of Bellary is one from which it has scarcely ever been a whole year absent since its first arrival,—breaking out in great severity every two or three years, while it confines its range very closely to that particular locality, and only occasionally attacks, and that generally to a very limited extent, the native troops stationed outside beyond the circle of its more prevailing influence, which seems to be concentrated about the bottom of the rock.

History of Events.—The head quarters of H. M. 39th Regiment arrived in Bellary on the 5th February, 1839; the strength of the corps was nominally 730 men, but it was soon reduced by discharges and deaths in the course of five months to 645. The regiment was quartered in the two barrack squares in the lower fort, each of which by the government regulations is estimated to contain 500 men.

This is an arrangement so confined and so little adapted to the health and convenience of the troops, that in these days of considerate reform I cannot help thinking a fair representation of its unfitness would induce the Madras Government to remedy the evil.

The space by regulation for each soldier, including doors and windows, is only four feet laterally; and subtracting the space for

60 doors and 146 windows, which are respectively five and four feet wide, the space allowed for the rest of the men must be proportionately curtailed, if 220 men do not sleep opposite to these.

The height of the wall is 12 feet in one barrack, and 10½ in the other; the height of the roof above is about six feet more. The breadth of the rooms is 20 feet. Hence the area cubically for each man is, on an average, as follows:—

Lateral space, 4 feet; height of wall, 11 do.; half the breadth, 10 do.; height of the roof, 6 do.; half of the roof, 6 do. by 10 and by 4 divided by 2: giving for each man an area of 560 cubic feet over the whole barrack. If we place the men's cots so as to prevent their being opposite to doors and windows, there will not be any interval between the cots, which are 2 feet 7 inches in breadth.

From the very nature of the regulations the troops are liable at any time to be crammed in this way. On our first arrival the whole barracks were given over, and by calculation I find that each man would have had between five and six feet of lateral space. On an average 80 men are in hospital, 100 on guard, and nearly 100 in the Patcherry huts; so that if there was no obstruction to the regular division, each man would have nine feet to himself. But the canteen, the spaces for pay serjeants, the band room, serjeants' mess room, &c. lessened the accommodation so much that the men never had six feet of absolute lateral space.

The operation of the government arrangement, as above stated, is so prejudicial and so much at variance with the received opinions of medical men as regards hygiene, that I dwell the more on this point with a view of eliciting fully the attention of the medical board to this important point, and of inducing government authorities to give it consideration; feeling assured that with their usual liberality and solicitude for the health and comforts of the soldier and the efficiency of the service, the proper remedies will be applied to adapt the quarters better to the climate.

I need not enlarge on the bad ventilation of the barracks, nor on the want of space in the verandahs, in which the men ought

to have tables and forms for taking their meals respectably at, nor the want of convenience for salutary ablution, and of wells of water within the square; neither need I mention the overwhelming nuisance of bugs, which swarm on the cots and the patchwork roofs in such numbers that the peace and rest of the men are absolutely *destroyed,* and lead to disease indirectly in various ways, especially from the men being obliged to resort to the open verandahs to escape their everlasting torment.

February was the month in which the turn of the seasons was manifested, and the heat became gradually great, averaging 85° Fahr. in the shade, and 130° in the sun at noon.

There were gusty winds from the north-east, with a few showers.

There was a good deal of fever during this month, which the men declared was contracted on sentry and in the guard rooms.

A committee of medical men sat upon these places, and reported them to be unfit for Europeans, being open to the prevailing winds, without either doors or windows, and without proper ventilation, combining the opposite faults of being too hot in the day time and too cold at night. The thermometer outside in the night was 61°, shewing a range of 60 degrees in the 24 hours, and the necessity for a corresponding protection from the two extremes.

In March the sky was quite clear; the wind wheeled round to the south-east and blew in gusty whirls, especially at night. During the whole of the hot season, there is a periodic whirlwind from the south-west, of great intensity, which, though warm, yet can carry away much of the heat of the body, especially if covered by perspiration.

The subject of dress attracted our attention, and as the febrile attacks were increasing among the men on the various guards, their state from being obliged to wear their full dress was examined into, and the distress from it found to be so great, that an official letter was addressed to the head-quarters through the divisional authorities on the subject, in consequence of which the European troops were allowed to wear white jackets on all garrison duties. This change was a great comfort during

the hot season; but at all other periods the cloth shell-jacket is the best and safest dress for men on guard.

On the 21st and 22d of March there were a few showers and much lightning, which, as it was without thunder, was passing from the earth to the clouds. With the exception of these partial showers, there was a great scarcity of water, and the large tank on the south-west of the fort was nearly dried up. How far the exhalations from this source may have conjoined with the winds, the heat, the economy of the dress, the bad guard rooms, and improperly ventilated barracks, swarming as they are with bugs, is an important question, and one which must be taken into account in the estimate of the salubrity of the fort generally, and in hot dry seasons especially.

Under the combination of heat, draughts, dress, unfitting accommodation, insufficient ablution, want of protection against prevailing winds, bugs, miasms, febrile and choleraic, certain it is, that cholera appeared on the evening of the 21st of March in a serjeant belonging to a company stationed at the western barrack, commonly called the right-wing barrack.

He himself lived in the huts occupied by the married people: he was not happy in his family concerns, having the misfortune to be linked to an abandoned woman for a wife.

This event corresponded with the visit of our deputy-inspector of hospitals, who has pre-eminently shewn himself the soldier's friend; and this case was watched by him with the most intense interest, as affording an opportunity of testing his views as to the efficacy of bleeding, saline enemata, cold affusion, effervescing draughts of carbonate of soda and tartaric acid, copious drinks of cold water with a small quantity of spt. æther. nitr., and external stimulants, to the exclusion of the too common routinal practice with calomel, opium, camphor, and brandy.

The success was so great in this instance, and in another case of choleroid depression in hospital at same time, that a great impression was made on our minds.

The course of events brought two squadrons of Her Majesty's 13th Light Dragoons to Bellary at this period; and it

became a question in what way it was possible to accommodate them, causing much difference of opinion among the local authorities, the officers commanding regiments, and the medical officers. It was ultimately decided that our right-wing barrack should be given over to the dragoons, and that the whole of the 39th Regiment should be compressed into the left-wing barrack, and the condemned fort hospital.

Deducting the men on guard, those in the Patcherry, and the sick from the rest of the strength, 450 remained to be crowded into these quarters in the hottest and most unhealthy period of the year, at a time also when cholera had appeared. The brunt of this bad arrangement fell undoubtedly on H. M. 39th Regiment. At first the dragoon horses were picketted outside the fort; but on some difficulties occurring as to the proper sites and conveniences for a mounted corps, the horses were also ordered inside the fort, and placed between the east gate and the bungalows of the officers.

The whole of the fort was now a crowded scene, with the barracks unusually full, and the open spaces all round occupied by tents and horses, forming altogether a sight pleasing only to those who imagine large bodies of men compressed into a small space may be as healthy as extended in clear open ground.

Subsequent events proved in themselves the best refutation of such views. Unfortunately for the efficiency of our representations, we had no statistical data to strengthen them, and sometimes it happened that the best reasons against contemplated injudicious measures were not known to be brought forward by us.

As a remedy against such ignorance in future, I would recommend statistical information relative to all arms of troops to be framed, and handed from one medical officer to another on departure and arrival of each station; and the superintending surgeon should demand duplicate receipts from each arriving medical officer, one to be given over to the officer relieved, the other for his own office.

Early in April cholera was on the increase in H. M.'s 39th Regiment, and soon attacked the two squadrons of dragoons:

the alarm was consequently great, and the depression of spirits, as usually happens, considerable.

Funerals became a daily occurrence, and women, children, and strong soldiers in the heyday of life were one after another consigned to the grave.

To relieve the crowded state of the barrack, on the 31st March four tents were obtained by H. M. 39th Regiment, pitched on the adjoining parade-ground, and occupied by 63 men. The sun had now become ardent, the winds were hot, and the sky unclouded. On the 6th April eight additional tents were procured, and occupied the same day by 81 men, raising the complement in tents to 144. At this time many cases of cholera of great intensity occurred in the barracks and old hospital, and the mortality was so considerable, that the regiment was marched out to camp on the 13th, with a view to escape from the concentrated morbific influence. Unfortunately it continued to stick to the regiment nevertheless, and 23 attacks occurred during the time it was under canvass between the 13th April and 7th May. There were a few intermissions, broken by insulated cases of the deepest intensity, and terminating in blue malignant collapse in twelve or fifteen hours.

On the 23d of April Lieutenant-Colonel Poole was the solitary case of the day.

From the 4th to the 16th of May there was a lull among the men out of hospital, and then one mild case took place. On the 19th a malignant case appeared, and another on the 20th. On the 22d a mild case occurred, which terminated the visitation of the disease.

There were a great many attacks in hospital, both in men who had been long under treatment, and in men, recently admitted for fever, in whom bloodletting had been practised. In this weak state, whether in convalescence or after depletion, cholera invaded thirteen patients, and proved fatal in eleven of them.

The frequency of these invasions in hospitals and in camp must be referred to the following causes.

Either these localities are within the peripheral range of cho-

lera, which apparently concentrates close to the granite rocks, on and near which the forts are built, or the disease became contagious in a low degree under peculiar circumstances. However, not one of the medical officers, subordinates, or coolies was attacked, and the medical subordinates with the coolies underwent great fatigue day and night; but it is worthy of observation, that Dr. Davis and the hospital serjeant used to perceive a metallic or galvanic taste in their mouth when they entered the cholera ward.

The cholera followed or attended the camp, and there attacked men who had previously been in robust health; but in the hospital it only exerted its morbific influence over ailing subjects within its reach, and fell more severely on the weakly men and on those labouring under fever, than on men having other kinds of complaints.

It therefore becomes a question whether it is proper to place choleraic patients in the same wards with other sick men, and also whether the men who came in with fever would have contracted cholera under any other circumstances.

In that part of the fort and fort hospital, where the sick women and children were treated, the disease principally attacked the convalescents from fever, and was unusually fatal. I can only lay my finger on two recoveries from cholera among the women. I might have said four, if two cases of choleroid disease were to be denominated cholera.

Among the children not a single one fought through the attack, but all were debilitated, broken down by teething, diarrhœa, fever, and marasmus.

With the view of concentrating the analysis of these cases, I shall subjoin a series of tables, showing the temperature outside, the quantity of rain, a rough estimate of the electrical phenomena, the number of cases which I call true cholera in the men, women, children, and officers, and also the cases which may be fairly called choleroid, including all doubtful cases in which the depression remained only temporary, and was early shaken off before the secretions became suppressed or altered in any great degree.

Table of Temperature, Rain, Lightning, Thunder, Choleraic attacks, Choleroid* attacks, and Choleraic deaths, from the 21st March till the 24th May, 1839.*

Thermometer outside.					Men.				Women.		Children.			
Month and Date.	6 A.M.	3 P.M.	8 P.M.	Lightning and Thunder.	Choleraic attacks.	Choleraic deaths.	Choleroid attacks.	Choleroid deaths.	Choleraic attacks.	Choleraic deaths.	Choleraic attacks.	Choleraic deaths.	Rain inches	Officer
Mar. 21	72	122	86	Lightning	1	0	0	0	0	0	0	0		
,, 22	70	126	86	....	0	0	0	0	0	0	0	0	.50	
,, 23	74	130	90	....	0	0	0	0	0	0	0	0	.10	
,, 24	78	120	88	....	0	0	0	0	0	0	0	0		
,, 25	80	130	92	....	0	0	0	0	1	1	1	1		
,, 26	82	132	90	....	0	0	0	0	0	0	0	0		
,, 27	82	138	96	....	0	0	0	0	0	0	0	0		
,, 28	84	130	97	....	2	1	0	0	0	0	0	0		
,, 29	82	124	94	....	1	0	0	0	0	0	0	0		
,, 30	82	136	94	....	0	0	0	0	0	0	0	0		
,, 31	82	130	92	Distant Thunder	0	1	0	0	0	0	0	0		
Apr. 1	82	132	94	....	0	0	0	0	0	0	0	0		
,, 2	82	130	92	Lightning	0	0	1	0	0	0	0	0		
,, 3	80	139	92	Do.	0	0	0	0	0	0	0	0		
,, 4	82	130	94	Do.	0	0	0	0	0	0	0	0		
,, 5	84	130	94	Do.	1	0	0	0	0	0	0	0		
,, 6	84	..	88	Thunder........	3	0	0	0	0	0	0	0		
,, 7	80	132	92	....	6	0	2	0	0	0	0	0		
,, 8	82	120	92	....	3	0	1	0	0	0	0	0		
,, 9	82	120	92	....	3	0	1	0	0	0	0	0		
,, 10	80	122	92	....	2	6	0	0	1	1	0	0		
,, 11	82	120	92	....	1	2	1	0	0	0	0	0		
,, 12	83	120	93	Thunder........	4	2	1	0	0	0	0	0		
,, 13	82	110	92	....	0	2	0	0	0	0	0	0		
,, 14	82	118	93	....	1	0	1	0	1	1	1	1		
,, 15	82	124	94	....	1	0	0	0	0	0	0	0		
,, 16	82	132	98	....	1	0	1	0	1	0	1	0		
,, 17	84	128	90	Thunder........	1	1	0	0	0	0	0	1		
,, 18	80	134	96	....	0	0	0	0	0	0	0	0		
,, 19	82	128	94	Thunder........	3	1	1	0	1	0	0	0		
,, 20	82	124	94	Do.	4	1	0	0	0	1	1	0		
,, 21	84	110	91	....	4	0	0	0	0	0	0	0		
,, 22	76	110	92	Lightning	0	0	0	0	0	0	1	1		
,, †23	86	112	90	....	2	0	0	0	0	0	0	1		
,, 24	82	100	96	Thunder........	0	0	0	0	0	0	1	1		
,, 25	80	120	82	....	0	0	0	1	0	0	0	0		
,, 26	82	113	86	Lightning	0	2	1	0	0	0	0	0		
,, 27	78	120	86	Do.	2	2	1	0	0	0	0	0		
,, 28	75	..	88	....	2	0	0	0	0	0	0	0		
,, 29	76	110	90	Thunder........	0	0	0	0	1	1	0	0		
,, 30	76	110	92	....	1	0	0	0	1	0	0	0		
May 1	78	110	91	Thunder........	2	1	1	0	0	0	0	0		
,, 2	76	116	94	Do	3	0	0	0	0	1	0	0		
,, 3	80	110	92	Lightning	1	0	1	0	0	0	0	0		
,, 4	80	120	91	Do.	0	0	2	0	0	0	1	1		
,, 5	84	100	92	Do.	0	1	0	0	1	1	0	0		
,, 6	82	120	94	Do.	1	0	0	0	0	0	0	0		
,, 7	80	112	92	Do.	0	0	0	0	0	0	0	0		
,, 8	82	110	90	Thunder........	0	0	0	0	0	0	0	0		
,, 9	78	111	88	Lightning	0	0	0	0	0	0	0	0	.23	
,, 10	76	112	88	Thunder........	0	0	0	0	0	0	0	0		
,, 11	76	112	86	Lightning	0	1	0	0	0	0	0	0	.10	
,, 12	80	118	84	Thunder........	0	0	0	0	0	0	0	0		
,, 13	78	98	84	Do.	0	0	0	0	0	0	0	0	.12	
,, 14	76	98	72	Do.	0	0	0	0	0	0	0	0		
,, 15	76	100	84	Do.	0	0	0	0	0	0	0	0	.10	
,, 16	75	100	80	Do.	0	0	0	0	0	0	0	0	.10	
,, 17	72	108	80	Do.	1	0	0	0	0	0	0	0	.83	
,, 18	74	100	84	Do.	0	0	0	0	0	0	0	0	.75	
,, 19	76	110	84	Do.	0	1	0	0	0	0	0	0		
,, 20	76	112	84	Do.	1	1	0	0	0	0	0	0	.45	
,, 21	76	86	82	....	1	0	0	0	0	0	0	0	.5	
,, 22	76	90	80	....	0	0	0	0	0	0	0	0		
,, 23	74	99	82	....	1	0	0	0	0	0	0	0		
,, 24	74	99	82	....	0	0	0	0	0	0	0	0		

† Lieutenant-Colonel Poole took ill in camp at 4 A.M. on the 23d April and died at 6 P.M.

* By the term *Choleraic*, I mean decided Cholera Maligna; and by *Choleroid*, disease resembling

There were several cases among the men in which there was a tinge of the disease, though not denominated cholera; and as a close distinction was made between choleroid and choleraic cases, so we may now state the number of diseases excluded from these lists over which cholera threw only a passing shade.

Four in March; two in April; two in May;—total, eight. These occurred in hospital, the first on the 22d of March, just before the sergeant of the grenadiers was *admitted:* his disease was readily shaken off. The second was the husband of the woman who died on the 25th; his fever was accompanied by vomiting, and ultimately it became so aggravated that he died suddenly in convulsions. His stomach was full of grape skins.

The other two in March were convalescents from fever, and were seized with faintness, purging, and a cast of the choleraic face: they recovered easily by the cold bath and stimulating treatment.

In April a sergeant, long an inhabitant of the hospital for hepatic disease and rheumatism, had a temporary increase of diarrhœa with a peculiar sinking, sufficient to shew a slight impression of cholera. The second man had during his fever vomiting and purging, which receded under treatment.

In May one of the cases might truly have been named cholera, but fever was the disease under which he was admitted into hospital: he recovered under the use of Graves's pills. The second was only a case of severe vomiting, which arose from the action of an emetic. The depression, however, was very great.

Re-uniting the choleraic and the choleroid diseases, we make a total of seventy-two.

It may be interesting to ascertain the localities in which the men were when they were first attacked: these were, in

The barracks till 13th April	11
Patcherry	4
Fort hospital	4
Tents	2
Guard stations	9
Regimental hospital, about two miles distant from the barracks on a rising ground, and near the race course	13
Camp, near and on the race course, from 13th April till 7th May	23
Both barracks after 7th May	6
Total	72

I shall give a table of the choleroid cases separate from the choleraic, with a few notices of their nature.

Names.	Age.	Date of Admission.	Symptoms.	Favourable Crisis, in Hours.	
Michael Callaghan	32	Apr. 2	Vomiting, purging, cramps	three hours	Had giddiness and tinnitus for two days before attack. The symptoms soon yielded to brandy, aromatics, baths.
John Stevenson ..	28	„ 7	Vomiting, coldness	three hours	Bath, enema salin., cal. ℈j.—recovered by shock of bath.
Thomas Shechan ..	29	„ 7	Ebriety with paralysis....	not cholera	After lying in a stupor, awoke hemiplegic.
Thomas Kiam	33	„ 9	Aspect choleraic	......	Kept for observation: stimulants, magnesia, rhubarb, and ginger.
Henry Black	28	„ 9	Got cramp with vomiting; no purging	early	Enema salin., bal. frigid., haust. efferves.
William Tucker ..	32	„ 11	Insolation, exposure; died suddenly after admission	......	Was bled, and died soon after; had dyspnœa and the signs of coma with tremors.
Patrick Smith	37	„ 12	Had slight cholera, preceded by tinnitus: pulse good all the time	......	Muriate of soda as an emetic, and calomel: bile and urine not absent long.
William Murray ..	36	„ 14	Fever with a little vomiting	......	Cholera did not come on.
John Hartigan....	36	„ 16	Fever, (not cholera,) with slight depression	......	Cholera did not come on.
Enoch Edwards ..	35	„ 19	Diarrhœa..............	cured, discharged.	Died from fever on the 7th May.
Joseph Bates	30	„ 26	Fever, with slight choleraic depression	four hours	Three days out of hospital: got emetics of muriate of soda, stimulants, castor oil, calomel, and opium; pulse never absent; bile and urine not suppressed.
Patrick Carmody..	..	„ 27	Fever, with vomiting, afterwards vomiting and purging came on	......	During the faintness the disease was named cholera.
John Banning	22	May 1	Debility, and choleraic face	......	Cholera did come on; Graves's pill given twice.
William Hill	39	„ 3	Dysentery, without cholera	......	In the depression and sweating, this was named cholera.
John Carpenter ..	28	„ 4	Fever, with vomiting	two hours	Graves's pill given.
Benjamin Gant ..	..	„ 4	Fever, vomiting with choleraic face	early	Graves's pill stopped the progress.

Table of Cholera among the Children.

Name.	Age.	Previous Disease.	Attack, Hour of.	Stage of Disease at Death.	Coma, Duration of.	Duration of Disease.	Treatment.
Child Fennighan	18 Months	Diarrhœa	7 P.M.	Blue	....	24 hours	Saline enema, bath, stimulants, sinapism.
,, Flynn....	14 ,,	Do.	3 P.M.	Blue	....	3 do.	Only a sinapism.
,, Smith....	16 Years	Fever	12 P.M.	Reaction	28 hours	30 do.	Saline enemata, mixed treatment, opened jugular veins in coma; she became hot at death; sinapism.
,, Dennis ..	7 ,,	Do.	7 P.M.	Reaction	24 do.	36 do.	Saline enemata, mixed treatment, Graves's pill, and cold affusion in coma.
,, Cheeke ..	2 ,,	Do.	10 A.M.	Blue	....	5 do.	Saline enemata, effervescing draughts; would not swallow any thing.
,, Cahill....	2½ ,,	Do.	7 A.M.	Blue	....	8 do.	Saline enemata, Graves's pill, baths.
,, Hill	5 ,,	Diarrhœa	5 P.M.	Blue	....	8 do.	Graves's pills.

Table of Cholera among the Women.

Name.	Age.	Date of Attack.	Previous Disease.	Duration of Disease.	Treatment.	Remarks.
Mrs. Smith......	39	Mar. 25	Fever	12 hours	Salines, baths, calomel, camphor, blisters, sinapisms, effervescing draughts	Died.
Mrs. Bartlett	17	Apr. 10	None	10 ,,	Salines, camphor, ammonia, frictions, blisters	Died.
Mrs. Greenwood	21	,, 20	Anasarca	24 ,,	Salines, stimulants, mixed treatment	Died.
Mrs. Coley......	18	,, 30	Fever	48 ,,	Graves's remedy	She had an abortion, & [sunk after.
Mrs. Hill	36	May 6	Hysteria	12 ,,	Graves's remedy, baths, venesection	Died.
Mrs. Hamilton ..	21	Apr. 29	None	Crisis, 2 days	Venesection, mixed treatment, Graves's remedy, blisters......................	Recovered.
Mrs. M'Carthy ..	40	,, 19	None	,, 2 ,,	Mixed treatment, saline enemata, effervescing draughts, baths................	Recovered.
Mrs. Mills	40	,, 16	Fever	,, 1 ,,	Mixed treatment	Recovered } both
Mrs. Conroy	35	,, 22	Do.	,, 1 ,,	Mixed treatment	Recovered } choleroid.

ABSTRACT OF RECOVERIES FROM CHOLERA NOT CONTRACTED IN HOSPITAL.

		General Statement of Events.					Progress and Character of the Disease.						Abstract of the Medical Treatment.												
NAME AND AGE.	Admission.	Date of Attack.	Hour of Attack.	Commencement of Treatment.	Favourable Crisis.	Interval from commencement of treatment to favourable crisis.	Duration of disease prior to commencement of treatment.	Rough estimate of intensity of disease before favourable crisis.	Return of bile after treatment, in hours.	Do. of Urine, in do.	State of the skin at the time of admission.	Spasms, if present, and of what description.	Frictions with Turpentine.	Saline Enementa.	Venesection.	Mustard Emetics on admission.	Sinapism to Epigastrium	Calomel and Opium with Tartar Emetic.	Calomel and Opium.	Camphor Mixture, Sp. Ammon. Arom., in small doses.	Tamarind Water, Lemonade, Cold drinks.	Nitrous Æther.	Cold Baths & Affusion.	Graves's Pill.	REMARKS.
J. Abbott 35	Mar 20	Mar 21	8 P.M.	10 P.M.	9 A.M.	12 hours	3 hours	Slight ..	45	46	Cold & moist	Legs & belly	1	Om. hora	1 lb.	..	1	....	4	Frequent	Frequent	....	Frequent	..	
G. Skipland 21	„ 28	..	8 A.M.	9 A.M.	11 A.M.	26 „	1 „	Severe ..	24	40	Do.	Legs	1	Do.	....	..	1	....	3	....	....	....	....	..	
T. French 22	Apl. 6	Apl. 5	2 A.M.	2 A.M.	11 A.M.	10 „	7 „	Sharp ..	24	30	Do.	Legs & toes	1	Do.	....	2	1	....	1	Do.	Do.	....	Do.	..	Bath did good; sinapisms, salines.
D. Coffee 32	„ 6	„ 5	2 A.M.	2 P.M.	7 A.M.	19 „	12 „	Medium.	22	28	Do.	Legs & thighs	1	Do.	1 syncope	..	1	....	2	Do.	....	....	....	..	
B. M'Sweeny 27	„ 7	„ 6	12 P.M.	6 A.M.	5 A.M.	24 „	6 „	Medium.	48	48	Warm	Legs & thighs	1	Do.	1½ lb.	..	1	....	3	....	Do.	....	Do.	..	
E. Woodhead 37	„ 7	„ 6	9 P.M.	6 A.M.	7 A.M.	25 „	9 „	Medium.	29	29	Cold & moist	Legs, thighs, & arms	1	Do.	....	2	..	....	2	Do.	....	Frequent	Do.	..	Vomiting continued long.
C. Kenning 24	„ 7	„ 7	6 A.M.	10 A.M.	1 P.M.	3 „	7 „	Mild ..	3	24	Cold	Toes	1	Do.	1 lb.	1	1	....	1	....	Do.	Do.	Do.	..	
I. Costills 33	„ 8	„ 11	9 A.M.	9 A.M.	6 A.M.	48 „	....	Severe ..	48	60	Cold & moist	Calves and thighs	1	Do.	....	..	1	....	12	Do.	....	....	Do.	..	Relapse after pul. jalap. comp.
E. Hall 32	„ 8	„ 8	6 A.M.	11 A.M.	1 P.M.	2 „	5 „	Mild ..	24	24	Do.	None	0	Do.	1½ lb.	..	..	....	2	....	....	Do.	Do.	..	
J. Jenkinson 32	„ 15	„ 15	1 A.M.	6 A.M.	1 A.M.	19 „	5 „	Medium.	29	30	....	Calves, thighs, & neck	0	Do.	...	..	..	Frequent	..	Do.	Do.	....	Do.	..	R. tart. ant. gr. vii, cal. ℈i, opii gr. xii,
T. Hayes 32	„ 16	„ 15	2 P.M.	6 P.M.	2 P.M.	20 „	5 „	Slight ..	20	20	Warm	....	0	Do.	....	..	..	Do.	..	....	Do.	Do.	Do.	..	[s pil. viii; sumat unam omni horâ.
C. O'Brian 30	„ 16	„ 15	1 P.M.	6 P.M.	6 P.M.	48 „	4 „	Great ..	48	50	Blue & moist	Legs	0	Do.	....	..	..	Do.	..	....	Do.	Do.	....	..	
W. Carrell 20	„ 18	„ 18	1 A.M.	6 A.M.	4 A.M.	22 „	5 „	Medium.	50	48	Cold	Thighs & calves	1	Do.	....	..	1	Do.	..	....	....	....	....	..	Nitric acid drink.
S. Foy 22	„ 20	„ 19	6 A.M.	9 A.M.	3 P.M.	6 „	3 „	Slight ..	8	10	Coldish	None	..	....	1 lb.	..	..	Do.	..	....	....	....	....	..	
W. Cummings 25	„ 19	„ 19	9 A.M.	9 A.M.	3 P.M.	6 „	6 „	Slight ..	6	6	Warm	Thighs slight	1	Do.	....	..	1	Do.	..	....	....	....	....	..	
R. Black 22	„ 20	„ 19	11 A.M.	11 A.M.	5 P.M.	6 „	10 „	Severe ..	30	30	Cool	Severe	1	Do.	1 lb.	1	1	Do.	..	....	Do.	....	....	..	
D. Freeman 38	„ 22	„ 21	10 P.M.	10 P.M.	2 A.M.	4 „	1 „	Slight ..	4	4	Warm	None	..	....	....	..	..	Do.	..	....	....	....	....	Do.	
O. Connor 36	„ 22	„ 21	4 A.M.	4 A.M.	12 A.M.	8 „	7 „	Slight ..	8	8	Do.	Slight	1	Do.	....	..	..	Do.	..	....	....	....	....	..	
W. Chamberland. 24	„ 28	„ 28	4 P.M.	4 P.M.	6 P.M.	40 „	8 „	Severe ..	96	96	Do.	Severe	0	Do.	1 lb.	..	..	Do.	..	Do.	....	Do.	....	Do.	One half mixed, the rest Graves's re-
Patrick Eagan 34	„ 30	„ 29	4 P.M.	4 P.M.	4 P.M.	42 „	1 „	Severe ..	70	70	Cool	Severe	..	....	1 lb.	..	1	....	1	Do.	...	....	....	Do.	Vomits green bile. [medy.
P. Higgins 30	„ 29	„ 29	12 A.M.	12 A.M.	6 P.M.	6 „	4 „	Slight ..	6	6	Warm	None	..	....	....	..	..	....	..	Do.	Do.	....	....	Do.	It passed off into fever.
J. Barry 31	May 1	„ 30	....	....	8 P.M.	4 „	4 „	Slight ..	4	4	Do.	None	..	....	....	..	..	....	..	....	....	....	....	Do.	
G. Williams 22	„ 2	„ 2	2 A.M.	2 A.M.	1 A.M.	23 „	1 „	Medium.	30	30	Cool	Thighs & legs	..	....	....	..	1	....	1	....	....	....	....	Do.	
J. Howkins 29	„ 15	„ 14	12 A.M.	12 A.M.	6 A.M.	18 „	3 „	Medium.	30	30	Do.	Thighs & legs	..	....	1 lb.	..	..	....	..	....	....	....	....	Do.	
J. Stewart 30	„ 21	„ 20	7 P.M.	7 P.M.	9 P.M.	2 „	4 „	Slight ..	36	36	Warm	Thighs & legs	1	Do.	1 lb.	..	..	....	1	Do.	. ..	Do.	....	Do.	

ABSTRACT OF DEATHS FROM CHOLERA NOT CONTRACTED IN HOSPITAL.

	Duration of Disease.					Progress and Character of the Disease.							Abstract of the Medical Treatment.							
NAME AND AGE.	Days.	Hours.	Hour of Attack.	Stage of Disease at Death.	Site of Spasms.	Occurrence of reaction.	Appearance of Bile after reaction.	Do. of Urine after reaction.	State of Pulse after reaction.	Coma and Delirium after reaction.	Time of Death after reaction.	Relapse after Recovery Hours.	Saline Enemata.	Sinapism to Epigastrium.	Venesection.	Boiling Water to Epigastrium.	Calomel and Opium.	Calomel.	Cold affusion or Bath.	REMARKS.
1 Joseph Hickson 32	..	34	3 A.M.	Blue Stage	In legs	....	....	....	....	....	....	48	Om. hora	2	1 lb.	1	3	ʒi	1	Relapse and died in second attack.
2 Robert Chignell 34	5	4	4 A.M.	Reaction	Toes	In 3 days	3 days	3½ days	90, full	2 days	2 days	....	Frequent	....	14 oz.	1	1	℈iv	Frequent	One grain of opium taken first day.
3 Jeremiah Crowley 26	5	½	8 A.M.	Do.	Legs and Thighs	4 days	None	None	80, weak	1 day	2 days	....	Do.	3	....	1	1	℈ii	Do.	One grain of opium; temporal arteries opened in coma without benefit.
4 William Sbarples 41	4	¼	11 A.M.	Do.	Do.	4 days	4 days	4 days	102, small	12 hours	1½ days	....	Do.	2	....	1	1	gr. x	....	Pulse never gone, one grain opium, temporal arteries opened in coma.
5 Thomas Gallovan 25	1	2	12 A.M.	Blue Stage	Do.	....	....	....	....	....	....	48	Do.	....	1 lb.	1	1	℈j	....	Recovered first attack; camphorated oil in second attack.
6 Thomas Bagg 23	..	15	6 A.M.	Do.	Arms and Legs	....	....	....	....	....	....	.. .	Do.	1	1½ lb.	1	....	℈j	....	Twice bled; worse after each bleeding.
7 John Well 29	..	17	1 P.M.	Do.	In belly	....	....	....	....	....	....	....	Do.	2	1 lb.	....	....	℈j	....	Quinine. Nitric acid for cramps.
8 Edward Owen 21	..	48	2 P.M.	Reaction	Legs	24 hours	6 hours	8 hours	small	None	24 hours	20	Do.	1	....	1	....	....	Frequent	Had a relapse at midnight, and died suddenly after jalap and colocynth.
9 Richard Hove 29	5	..	5 A.M.	Do.	Calves and Thighs	3 days	None	None.	108	36 hours	2 days	....	Do.	2	1½ lb.	....	....	....	....	
10 Thomas Howarth 25	..	15	5 A.M.	Blue Stage	Legs and Stomach	....	....	....	....	....	....	....	Do.	1	....	1	....	....	Frequent	
11 Charles Reeves 25	..	30	7 P.M.	Do.	Legs	....	....	....	....	....	....	....	Do.	....	....	....	....	....	....	
12 Thomas Purcell 24	..	14	5 A.M.	Do.	Legs and Thighs	....	....	....	....	....	....	....	Do.	....	....	1	....	....	....	
13 James Phillipps 21	..	12	5 A.M.	Do.	Legs, &c.	....	....	....	....	....	....	....	Do.	....	....	....	....	....	Frequent	
14 Daniel Reed 32	..	20	7 A.M.	Do.	Toes	....	....	....	....	....	....	....	Do.	....	1 lb.	....	. ..	Calomel and Ant. Tart.	....	
15 Samuel Wilson 25	..	15	6 A.M.	Do.	Stomach and Legs	....	....	....	....	....	....	....	Do.	1	....	....	....	1	....	
16 John Axon 32	..	13	3 A.M.	Do.	Legs, Neck, & Fingers	....	....	....	....	....	....	....	Do.	....	....	1	....	....	....	Graves's Pill.
17 James Smith 20	..	28	7 A.M.	Do.	Limbs	....	....	....	....	....	....	....	Do.	....	....	1	....	1	....	
18 Michael Pearse 30	..	10	3 A.M.	Blue	Severe	....	....	....	....	....	....	....	Do.	2	....	....	....	....	Frequent	Died in convulsions.

ABSTRACT OF THE CASES OF CHOLERA CONTRACTED IN HOSPITAL.

NAME AND AGE.	Duration of Disease. Days.	Duration of Disease. Hours.	Hour of Attack.	Stage of Disease at Death.	Occurrence of reaction.	Appearance of Bile after reaction.	Do. of Urine after reaction.	State of Pulse after reaction.	Coma after reaction.	Time of Death after reaction.	Relapse after reaction.	Saline Enemata.	Sinapisms to Epigastrium.	Venesection.	Affusion and Baths.	Boiling water Blister.	Calomel and Opium Cases.	Calomel.	REMARKS.
1 John Sweeney 28	0	11	10 P.M.	Blue.	9 hours.	....	....	...	....	....	....	Frequent.	Frequent.	....	Had.	....	....	15 grs.	The febrile heat soon merged into cholera.
2 Thos. Cunningham 32	3	0	10 A.M.	Reaction.	10 hours.	Doubtful.	None.	....	Doubtful.	18	....	Do.	Do.	....	Do.	Do.	....	℈ij	Came drunk two days before attack to hospital.
3 Mich. MacCarthy 32	2	0	2 P.M.	Blue.	None.	....	....	....	....	....	....	Do.	Do.	....	Do.	Do.	....	....	Was two days treated for fever, when cholera came on.
4 Robert Youd 32	3	0	10 P.M.	Blue stage.	....	....	....	....	....	....	....	Do.	....	....	Do.	....	....	10 grs.	Debilitated and lingered on so long.
5 Mauris Hartnet 31	0	15	9 P.M.	Blue.	....	....	....	....	....	....	....	Do.	....	....	Do.	Do.	6	....	Bled for fever, before cholera came on.
6 Patrick Foley 39	2	4	6 P.M.	Imperfect reaction.	36 hours.	Doubtful.	A little.	Weak.	12 hours.	16	Relapse.	Do.	Do.	1 lb.	Do.	....	Frequent.	....	Bled before cholera came on.
7 Joseph Peake 29	1	6	9 A.M.	Blue.	....	....	....	....	....	....	Do.	Do.	Do.	1 lb.	Do.	Do.	. . .	....	Urine passed in interval with relief, relapse after jalap.
8 James Dobson 25	0	7	10 A.M.	Do.	....	....	....	....	....	....	....	Do.	....	....	....	....	1	....	Pulse gone in two hours.
9 Michael Cunniff 34	0	5	5 P.M.	Imperfect reaction.	3 days.	None.	None.	Weak.	24 hours.	24	....	Do.	Do.	....	Do.	....	4	....	
10 Michael Rouch 29	8	0	6 A.M.	Reaction perfect, but died blue.	2 days.	3 days.	Urine drawn off in 3 days & came in 6.	Ditto.	None.	6 days.	Relapse from jalap.	....	....	....	Do.	....	....	℈ij	He apparently recovered.
11 Henry Gibson 28	1	0	6 P.M.	Blue.	....	....	....	....	....	....	....	....	Do.	....	Do.	....	....	10 grs.	Bled in fever.
Recoveries from Cholera contracted in hospital.																			
12 Serjeant West Brook	0	12	5 P.M.	Recovered.	....	....	....	....	....	....	....	Do.	....	....	....	....	....	....	Had abscess after recovery.
13 William Murray	0	12	5 P.M.	Do.	....	....	....	....	....	....	....	Do.	....	....	....	....	....	....	Very slight case.

Annexed are given abstract tabular forms of the treatment in he recoveries from cholera, and separate tables of the fatal ases of men attacked in hospital and of men who came to hosital affected with the diseases, respectively.

By examining the foregoing tables of the 56 men, many imortant circumstances may be ascertained.

1st. The hour at which the disease attacked.

2d. The ages of the men attacked.

3d. The presence of the secretions in reaction; and also the umber of instances in which bathing, effervescing draughts, aline enemata, venesection, calomel, opium, and tartar emetic, Graves's pill, &c., were used.

Table shewing the hour of attack, the ages of men attacked, the number attacked at each hour, and the number attacked of each age.

Hour of attack.	Number.	Ages. Years	Ages. Number.
1 A. M.	4	20	2
2 ,,	,,	21	3
3 ,,	4	22	4
4 ,,	2	23	1
5 ,,	5	24	4
6 ,,	6	25	6
7 ,,	2	26	1
8 ,,	3	28	2
9 ,,	3	29	5
10 ,,	2	30	3
11 ,,	1	31	2
12 Mid-day.	2	32	10
1 P. M.	2	33	1
2 ,,	4	34	4
3 ,,	1	35	1
4 ,,	,,	36	1
5 ,,	2	37	1
6 ,,	2	38	1
7 ,,	2	39	1
8 ,,	1	40	1
9 ,,	4	41	1
10 ,,	2		
11 ,,	,,		
12 Midnight.	1		

Constitution of the regiment, with the number of attacks of cholera according to age, and ratio per cent. of each age.

Age.	No. of Men of regiment.	No. of choleraic attacks according to age.	Ratio per 100 in choleraic attacks in each age.
40 and upwards.	8	2	25.
35 ,,	85	5	5.88
30 ,,	851	20	5.67
25 ,,	104	14	13.46
20 ,,	86	14	16.27
18 ,,	10	None.	
under 18	7	None.	

Out of nine cases of reaction, bile was supposed to be secreted, in consequence of the stools approaching in appearance to fæces, in four cases; and urine of a scanty nature, but not examined, was stated to be passed by the patients in five instances.

The quality of the urine in cholera is ascertained to be abnormal, even when secreted; and unless a careful examination of its character could shew what is actually passed to be natural, the prognosis is not so favourable.

The evidence adduced in favour of the secretion both of bile and urine is very doubtful, in so far as the alvine evacuations on becoming dark were called fæculent; and the occurrence of micturition depended on the assertions of the patients more than on observation. So far our deductions are unsatisfactory. One or two patients having bilious stools, and apparently natural urine, died suddenly in a relapse after the administration of pulv. jalapæ comp. with calomel and colocynth. During the operation of the medicine choleraic depression came on, and death took place in a rapid way.

Hence I am inclined to think that strong purgatives exhibited in favourable reaction, especially in weak men, are dangerous.

How far does this confirm or otherwise the reasoning by which it was believed that the diminished bulk of the blood had some influence on the train of symptoms; and the question, whether an abstraction of the newly-generated serum or serosity may not be attended by the worst of consequences?

Venesection was performed in nine cases of the deaths. The blood flowed in most of them freely, and was not very dark, nor had it lost its coagulating proportion. In the intense cases the syncopal depression seemed irrecoverable; and after venesection the symptoms went on the more rapidly towards a fatal termination. In the recovered cases venesection was performed eleven times. The usual quantity taken was not more than a lbi ss.—frequently one pound. In the early stages the blood was dark, but not so dissolved as that drawn in the collapse of malignant cases. Venesection was performed in 20 cases

altogether, and the ratio of recoveries is as 11 to 9; and the proportion of recoveries in which bloodletting was not performed is as 14 to 11. Of the fatal cases 20 were not bled at all.

Bleeding, therefore, as based on numerical calculation, is a doubtful remedy, and is nearly equally balanced in results with its omission.

Perhaps the same estimate may be drawn of it as of other remedies. When the morbific cause has fallen lightly on the system, the loss of blood does no injury, and recovery takes place, which also might have taken place without this operation.

Subsidiary to the intensity of the disease I am inclined to think robust men bear bleeding better than the weakly, and this because their normal and bulky state of the blood will bear it.

When men have been bled for fever, and their blood diminished in quantity otherwise by purgatives, and perhaps dissolved by calomel, the attack of cholera is very dangerous: hence an additional reason for insulating fever cases and other convalescents from cholera patients.

Hiccup occurred in a few patients, some of whom recovered and some died, showing that no prognosis of importance one way or other can be derived from this symptom.

Twenty cases of death occurred in the blue stage, in which the chain of morbid symptoms was not broken in the least by our remedies.

In sixteen the saline enemata, composed of muriate of soda, carbonate of soda, and tincture of assafœtida with warm water, were assiduously given every hour.

In four Graves's pill was given according to his directions.

In eleven cases effervescing draughts were given as a drink.

In four mustard emetics.

In almost all sinapisms. }
In the same blisters .. } to epigastrium.

In a few boiling water to epigastrium and spine.

Baths were given frequently in ten cases.

The quantity of calomel and opium in conjunction was small.
The doses of simple calomel were large but not frequent.
Many got frictions.

Five got calomel, opium, and tartar emetic every hour, along with salines, baths, and blisters.

A considerable number got camphor, spirit. ammoniæ aromat., and brandy in the intervals of other treatment.

In the cases of reaction the same manner of treatment was prescribed, only blisters to the head and spine were more frequently applied, and purgatives with leeches and the cold affusion were more systematically employed to relieve coma.

In the only case of reaction treated by Graves's mixture the vomiting became green, and the same was the case in the other few recoveries in which this remedy was administered.

In the fatal cases among the men, women, and children, in which no reaction occurred, the bile did not flow; from which circumstance I would suppose the spasm in the biliary vessels or ducts was so great that the remedies did not undo it. In some few cases where vomiting ceased, either the sensibility of the stomach was absent, or spasms existed at its lower orifice, as all the ingesta were found in it after death.

The mixed treatment, so named from the combination of the salines with calomel, opium, and tartar emetic, was apparently efficacious in a considerable number of instances: the tartar emetic seemed to empty out the gall-bladder according to the well-known action of this medicine.

In the mild cases I deem saline treatment, stimulants, cold baths, bleeding, mixed treatment, calomel and opium, and Graves's pills nearly alike efficacious. Recoveries took place under all modifications and varieties with and without blistering.

In a certain number of cases no one remedy or combination of remedies seemed of any efficacy whatever.

In 150 cases of collapse in Edinburgh Dr. Mackintosh apparently recovered twenty-five by saline injections into the veins; and he states that the pulse and animal heat, &c. returned, while the sweating ceased for a time as long as the bulk of the

circulating fluid was kept up; but as soon as the purging drained away the newly supplied matter, the patient relapsed into his former state. In one woman the fluid was supplied six times, and she ultimately recovered. There are difficulties in this operation, however, such as could not be easily surmounted in military hospitals in India with limited medical assistance during severe epidemic visitations; but under favourable circumstances I would certainly resort to it in bad cases.

But the mere supplying of an equivalent for the serosity to the blood will evidently avail little, unless in some way the influence of the morbific agent in the system, and particularly on the diseased circulating blood, can be removed; and the very ratio of recoveries by this operation is much against any sanguine hope of enlarged benefit from it.

In the course of our treatment it is worthy of remark that little opium was given, especially in the cases where reaction occurred; but from the whole, I think a fair deduction may be drawn that all cases of coma do not proceed from the use of narcotics. The cases in which reaction occurred had certainly all the characteristic signs of cholera, but in several the pulse never was imperceptible. In the reaction the pulse increased in volume, the skin became for a short time warmer, and the sweating ceased; but there were relapses into the sinking state, with vomiting, which remained generally till the end of the disease.

The reaction was imperfect in a few, and sometimes heightened gradually into delirium and insensibility, the train of morbid changes being apparently alone the cause of this state.

Latterly, in addition to the dash of cold water, the vesicatory applications, Graves's pills, the mixed treatment, and calomel and opium, quinine in large doses (of 10 grains), with diuretics, and fomentation to the pubes, were resorted to, but without any good result.

In fact, all the cases which were malignantly severe at the onset, and all the fully formed conditions of intense *choleraic* disease, proved fatal.

In milder cases the mixture of camphor, laudanum, and tartar

emetic (also recommended by Dr. Graves) proved very useful; but it was always conjoined with baths or cold affusion, sinapisms, and saline enemata.

The enemata consisted of muriate of soda, carbonate of soda, and tinct. assafætida, and were given every hour with great industry to the greater proportion of the patients, and sometimes every half hour. Effervescing draughts, tamarind drinks, and cold water were administered according to the desire of the patients.

Emetics of various kinds were given early on theoretical grounds, derived from the belief that the absence of vomiting in malignant cholera is one of the most fatal symptoms, arguing the irritability of the stomach to be completely destroyed. There is some truth in this too, and the practice of giving emetics of mustard, &c. is worthy of very favourable consideration.

In drawing an estimate of the value of the above modes of treatment I am inclined to place them on nearly an equal level. I am disposed to think that they will all fail in *malignant* cholera, and only succeed in cases which are in their nature recoverable from the low intensity of the morbific agent. Graves's pill is *an accession* to the list of cholera medicines; but it signally failed in all cases where the disease was severe, and in that respect has no greater claim to attention than any other remedy. Both Dr. Davis and myself have reason to think, on very mature observation, that although Graves's pill had considerable effect in checking vomiting and purging in cholera, its further utility is very doubtful; for where it was much used in any case, constipation and considerable derangement of the stomach and bowels attended the secondary stages, (symptoms not observed when other modes of treatment were employed), thereby rendering convalescence more tedious and precarious.

Under various circumstances it is advantageous to have a choice of remedial means; and, on the whole, I think one of the most safe and efficacious in recoverable cholera is the mode of treatment advocated by Dr. Murray; at the same time the labour of administering hot saline enemata is against it on a

march, and fortunate it is that we can then fall back upon Graves's pill, calomel, opium, and tartarized antimony, cold affusion, and other accessories to oppose this potent enemy of humanity.

I must say that calomel and opium, in which many have so much confidence, proved not a whit more efficacious than other well-directed agents, and is certainly over-rated as a remedy by those who assign to it the first rank for the cure of cholera.

The following is an *analysis* of the cholera cases in A Company of the 2nd battalion Madras Foot Artillery, stationed in Bellary Fort during the months of March, April, May, and July, 1839, from the Hospital Register, *with permission.*

No. of Cases.	Names.	Age.	Service in India.	Admitted.	Discharged.	Died.	Remarks.
1	M. Sullivan.	29	8	11 Mar.	....	11 Mar.	
2	J. Brown...	26	4	17 Apr.	....	19 Apr.	
3	A. Wilson..	28	8	18 do.	....	18 do.	
4	J. Fitzpatrick	32	7	25 do.	6 May	....	Slight.
5	C. Hanagam	24	3	25 do.	12 do.	....	do.
6	J. Turner	29	4	30 do.	4 do.	....	do.
7	J. Tolson ..	37	18½	2 May		3 May	
8	W. Potts. .	25	5	2 July		3 July	
9	W. Edwards	29	5	8 do.		8 do.	
10	W. Doolan .	..	..	9 do.		11 do.	
11	J. Dimmock	27	5	9 do.		10 do.	
12	J. Holcroft .	38	15	11 do.		12 do.	8 hours ill.

1st Case. Had a short illness. The treatment consisted in calomel and opium, (cal. gr. iij. op. gr. ½, ant. tart. gr. 1 secundâ quâque horâ); stimulating and opiate draughts; h. effervesc.; sinapism; blister.

2nd. Treatment stimulating; calomel, opium, and tartar emetic; h. effervesc.; sinapism; blisters.

3rd. Treatment stimulants, with nitrous æther added to his drink.

4th. This was a case of *choleroid* depression, with *bilious* evacuations: he recovered under calomel and opium.

5th. This was a slight case, and may be rather considered one of sharp choleroid diarrhœa.

6th. Also a slight case: Graves's pills were given, and the evacuations became fæculent the same night.

7th. Was ill five hours before admission at 9 P.M. Graves's pill given, and brandy. The vomiting and purging were very slight; yet he died.

8th. Treated by calomel and opium, with stimulating draughts, vesicatories, &c.

9th. This case had a mixed treatment: at first, large doses of calomel and opium; then he was subjected to cold affusion, effervescing draughts, æther, and vesicating applications.

10th. Treatment, calomel and opium, with stimulants.

11th. Venesection, calomel, and opium; infusion of capsicum, with tincture of ginger, and camphor. *Dissection* showed the usual morbid appearances after this disease, with the addition of a clot in the right ventricle of the heart, and semi-coagulated blood in the vena cava and auricle.

12th. Taken ill at 9 P.M. and died at 5 A.M. next morning. Treatment, calomel, opium, æther, effervescing draughts, and affusion baths.

I shall now proceed to show the frequency of cholera in and out of the Fort of Bellary, from 1818 down to the present time.

H. M.'s 84th Regiment was stationed in the fort at that early period. It was relieved in 1820 by H. M.'s 46th Regiment, one wing of which was at Bellary, the other at Belgaum. Towards the middle of 1826, H. M.'s 41st Regiment garrisoned the fort, and remained about one year; after which it was relieved by H. M.'s 48th Regiment. This was again relieved, at the end of 1831, by H. M.'s 55th Regiment, which remained till near the end of 1836. H. M.'s 41st Regiment then returned, and reoccupied the fort till the end of October, 1838. The right wing of H. M.'s 39th Regiment succeeded it in November, and was followed by the head-quarters in February, 1839.

At the end of March two squadrons of H. M.'s 13th Light Dragoons and a troop of European Horse Artillery joined the

division. The dragoons were quartered, as mentioned before, in the fort, in one wing of the barracks usually given over to the infantry regiment.

The horse artillery occupied part of the old dragoon barracks *outside* the fort, and were comparatively free from cholera.

There was always a large body of sepoy troops stationed outside in the native lines; but since 1815, 1816, 1817, and 1818 no Europeans were quartered in the old dragoon barracks; and unless with *the officers* of sepoy regiments, there is no means of contrasting the sickness among Europeans within and without the fort for a longer period than three months in the present year.

I shall first give a table of the average strength of royal

Table of cholera among the royal troops.

Years.	Average strength.	Admissions of cholera.	Deaths.	Ratio per cent. of admissions to strength.	Ratio per cent. of deaths to admissions.
1818	694	159	24	22.91	15.1
1819	186				
1820	673	49	10	7.28	20.41
1821	457	4		.87	
1822	502	4	1	.79	25.
1823	616	8		1.29	
1824	593	43	12	7.25	27.9
1825	398	24	7	6.	29.17
1826	572	5	1	.87	20.
1827	425	124	59	29.18	47.58
1828	811	69	31	8.5	44.93
1829	790	20		2.53	
1830	790	32		4.	
1831	641	74	30	11.54	40.54
1832	726	3	1	.41	33.33
1833	741	81	35	1.93	43.21
1834	643	2	1	.31	50.
1835	794	1		.12	
1836	824	7	2	.84	28.57
1837	896	38	11	4.24	28.95
1838	704	14	5	.2	35.71
1839	680	72	31	10.59	43.05
13th L.D. 1839	238	36	15	15.12	41.72
Total . . .	14394	869	276	6.	31.76
Annual Average..	654.6	39.5	12.54	6.	31.76

troops, the number of attacks of cholera, and the number of deaths; and contrast this, for a more limited time, with the attacks among the native troops in the same cantonment.

I am inclined to think there is nothing unfair in this, as natives within the range of cholera are at least equally obnoxious to its influence as Europeans; if there is any immunity in Bellary, I think I am warranted from these tables in drawing the conclusion that the native lines are *comparatively* beyond the sphere or circle of cholera.

I have it in my power to add a table of the attacks of cholera among the officers, women, and children of H. M.'s corps from 1827 to the end of 1838.

	Officers.			Women.			Children.			Remarks.
	Admit.	Disch.	Died.	Admit.	Disch.	Died.	Admit.	Disch.	Died.	
1827	..	..	..	6	3	3				Named Cholera Morbus.
1828	1	..	1	31	24	7	114	110	4	
1829										
1830										
1831	..	..	..	3	..	3	3	..	3	
1832	..	..	..	1	1	..	1	..	1	
1833	4	..	4	19	13	6	15	9	6	
1834	1	1								
1835										
1836										
1837	1	..	..	9	5	..	5	2	2	
1838	3	2	2	2	4	2	3	1	3	
Total..	10	3	7	71	50	21	141	122	19	

It is curious that the European Foot Artillery stationed in the fort have had so few cases of cholera. The first of the following tables exhibits the disease among them; the second refers to the European troops outside,—the Honourable Company's Horse Artillery,—from the 25th March to the 31st July, 1839.

Years.	Average Strength.	Admissions.	Deaths.	Ratio per cent. of admissions to strength.	Ratio per cent. of deaths to admissions.
1827	137	2	..	1.46	
1828	121	25	4	20.66	16.
1829	124				
1830	123				
1831	141	2	1	1.41	50.
1832	131				
1833	97	2	1	2.06	50.
1834	95				
1835	105				
1836	99				
1837	100	1	1	1.	100.
1838	102				
1839	103	12	9	11.65	75.
Total...	1478	44	16	2.97	36.36
Annual.. Average..	114 nearly	3.38	1.23	2.97	36.36

Year.	Average Strength.	Admissions.	Deaths.	Ratio per cent. of admissions to strength.	Ratio per cent. of deaths to admissions.
1839	103	6	0	5.82	0

Table of the Native Troops for 12 *Years from* 1827 *up to July,* 1839, *in the Native Lines at Bellary,—outside the Fort.*

Year.	Average Strength.	Admissions.	Deaths.	Ratio per cent. of admissions to strength.	Ratio per cent. of deaths to admissions.
1827	3696	17	3	0.46	17.64
1828	3072	138	66	4.49	17.82
1829	2952	..	..	....	....
1830	3167	..	..	....	....
1831	2265	4	4	.17	100.
1832	2438	4	1	.16	25.
1833	2469	62	33	2.51	53.22
1834	2272	3	1	.13	33.33
1835	1516	2	..	.8	....
1836	2757	..	..	....	....
1837	2210	15	4	.67	26 66
1838	1960	36	19	1.83	52.77
1839	2509	21	12	.83	57.14
Total Strength }	33283	302	143	0.90	47.35
Annual Average }	2560	23.23	14	0.90	47.35

Having thus shewn the lower fort and the European troops stationed in it to have been more frequently attacked with cholera than the native troops in their lines outside, it follows that the lower fort of Bellary is apparently more within the range of the concentrated morbific agency of this scourge than other places in its immediate neighbourhood.

In the fort the fear of a repetition of similar attacks to what we have just experienced hangs yearly over our heads; and whether with or without epidemic visitation, past experience shews that an annual average mortality of from 15 to 19 per 1000 from this disease alone may be expected for the future.

There is always a difficulty in proving that European troops stationed in the neighbourhood would be more exempt, as there has not been an opportunity for judging; but if we reason from the immunity experienced by native troops, I am inclined to think the same would be the case in European regiments.

In July cholera returned in a curious way among us in the fort.

On the 4th one solitary foot-artilleryman got cholera, and, in spite of the remedies most approved by our experience, he died. Next week four more got cholera,—all died; and during their treatment in hospital, a poor soldier of H. M.'s 39th Regiment recovering from rheumatism, for which he had been salivated, was attacked at 9 P.M. on the 8th July, and died at 9 A.M. the following morning. Two cases of cholera appeared in barracks, which being slight were detained in the fort hospital, and both recovered. Graves's mixture for delirium tremens was given in both cases, and *had no bad effect.*

In August a solitary instance of cholera maligna appeared in a soldier of H. M.'s 39th Regiment on the 6th, which terminated fatally after eleven hours. Sulphate of quinine was given, and the stomach retained all ingesta during the last six, hours. He only vomited once during his illness, and was purged six times. He was bled at noon, six hours after the commencement of the attack; the blood flowed at first freely, but as he got faint, it came only in drops. The blood was dark, and formed a soft

coagulum. The sweat was acid, and strongly impregnated with muriate of soda. The discharges per anum were quite neutral, and held flakes of mucus, which when removed left a brown fluid. Heat had no effect upon this except in giving out a urinous odour. Nitrate of silver gave a most weighty and copious precipitate, showing an excess of muriate of soda. About 6 lbs. of fluid came away per anum, and a large undetermined quantity by the skin; not much by vomiting.

The early affusion-bath revived the patient; but the bleeding sank his vital powers completely. About two hours before death he became insensible: he was pulseless, and no reaction was indicated. There was a clot in the right side of the heart, and the blood in the aorta was dark and coagulated. There is no doubt from the appearance on dissection, that blood, diseased as to composition and quantity, circulates in the arterial system. The kidneys were deeply injected, the vessels in the tubuli greatly so.

The urine, as in former cases, was very scanty, and mixed with the mucus of the bladder; and when heated, it was found acid and coagulable. The lungs were collapsed; this was seen in several other instances. The kidneys in some previous cases were greatly altered, but perhaps this may have been accidental: the increased size and yellow deposition in the cortical part favour this idea.

The alteration in the kidney, however, taken in connection with the retention of urea, is a point worthy of examination. It may not lead to practical benefit, but abstractedly it is interesting to ascertain what changes are synchronous with or existing before the attack of cholera under which the patient has sunk.

I consider it unsafe *(unfair)* to draw a general comparative ratio of deaths to attacks, as there is reason to believe that the diagnosis has not been always strict in those returns where a great proportion of admissions appears opposite to a few deaths. A close scrutiny shows little more than half of the cases

decidedly cholera to be saved, and frequently less: for this reason I have confidence only in the ratios of what passed before me.

The total number of severe cases among the men in March, April, May, July, and August was fifty-eight; out of which were thirty-one deaths. There are on the return nineteen cases named cholera, which a close scrutiny would only allow to be choleroid.

It would have been interesting had I been enabled to subjoin a table of the millesimal ratio monthly; but the returns of admissions and deaths for years back are not so complete as I could wish for that purpose. I may, however, state that April seems to have been the month in which the greatest number of cases occurred; but in order to shew, so far as in my power, how this matter stands, I shall subjoin a table of the admissions in each half year from 1827 to the end of June, 1839, among Her Majesty's troops.

	1828.	1829.	1830.	1831.	1832.	1833.	1834.	1835.	1836.	1837.	1838.	1839.
1st half-year.	61	12	22	71	1	75	1	1	0	1	5	108
2d do. . . .	8	8	10	3	2	1	1	0	7	37	9	0

General Remarks.—After having thus examined the various attacks of cholera, our attention may be beneficially turned to the general salubrity of Bellary as a station for Her Majesty's troops.

It may be said that 1839 was unusually unhealthy, and that the troops suffered unusually in consequence of the drought, and also from having recently arrived at the station.

In taking average strengths, we are subject to great errors, which could only be avoided by access to the returns in the offices of the adjutant-general, medical board, and deputy-inspector of hospitals respectively; and this is most apparent from the example I shall adduce in our own regiment. The

strength of the regiment on our arrival was nominally 730; there were, however, 44 men sent away as invalids, but still borne in the orderly room books till their discharges shall be notified from the Horse Guards.

The true strength *exposed* at Bellary were therefore less, being in the following ratio :—

	MEN.			OFFICERS.	
Months.	Nominal Strength.	True Strength.	Average daily sick.	Nominal Strength.	True Strength.
February	730	686	45	40	33
March	727	682	73	39	36
April	723	681	88	37	37
May	692	651	107	37	33
June	640	639	84	37	29
July	643	631	92	37	27
Average	692	661	81	38	32

The strength of both classes being thus ascertained, we can with more accuracy proceed to state the annual true ratio of sickness and mortality in Her Majesty's 39th Regiment during the six months above specified.

MEN.

Months.	Strength.	Admissions.	Deaths.	Annual ratio of admissions per 1000 of strength.	Annual ratio of deaths per 1000 of strength.
February	686	81	2		
March	682	119	4		
April	681	203	28		
May	651	250	11		
June	639	150	3		
July	631	127	5		
Total	3970	930	53	2818	160.60
Average	661				

OFFICERS.

Months.	Strength.	Admissions.	Deaths.	Annual ratio of admissions per 1000 of strength.	Annual ratio of deaths per 1000 of strength.
February	33	14	..		
March	36	9	1		
April................	37	17	2		
May	33	13	..		
June	29	8	..		
July	27	6	..		
Total	32	67	3	1487.5	187 5

As H. M.'s 13th Light Dragoons and European Horse Artillery were for a limited time at the same station with H. M.'s 39th and the European Foot Artillery, I shall therefore contrast the sickness in these corps together for the months of April, May, June, and July.

Corps.	Strength.	Admissions.	Deaths.	Annual ratio of admissions per 1000 of strength.	Annual ratio of deaths per 1000 of strength.
H. M.'s 39th Regiment. .	650	640	46	29.49	212.
Do. 13th Light Dragoons	231	264	25	34.28	324.67
European Horse Artillery	102	132	..	38.82	....
Do. Foot do..........	103	148	11	43.50	323.5

The 13th Light Dragoons, H. M.'s 39th Regiment, and the Foot Artillery in the fort all suffered from cholera. The two Queen's corps were moved out of the fort in April, and both carried the cholera in their train to the camp.

From exposure outside many instances of sudden death occurred, which may in future cause some hesitation about moving into camp at such an ardent season of the year.

The sickness in the camp, though not numerically in greater proportion than in the Horse Artillery, was of a more severe and fatal nature, which would have been avoided in all probability had the Queen's Regiments never entered the fort.

From the combined causes mentioned the soldiers suffered

severely, but not more so than their wives and families left in the fort.

The officers in the camp were, generally speaking, remarkably healthy, and few contracted any disease. Those previously sick and delicate remained in the fort. The following admissions and deaths took place among the women and children.

	WOMEN.			CHILDREN.		
Months.	Strength.	Admissions.	Deaths.	Strength.	Admissions.	Deaths.
February	70	6	0	111	17	2
March	70	12	2	111	28	7
April	64	31	2	103	58	8
May..............	61	23	3	99	55	4
June	57	13	1	98	28	2
July..............	57	4	0	98	34	0
	63	89	8	103	220	23

During the latter four months eight officers were obliged to seek recovery from change of station in India, while two went to Europe. In fact, though the horse artillery, and perhaps also the officers of the cantonment outside, had a greater ratio of attacks, the brunt of suffering was all on the side of the troops belonging to the fort.

The influence of various habits and accommodation in India is yet a problem, and the officials at head quarters could confer no greater benefit than to illustrate from numerical data many such interesting points which are of particular importance to the service. Limited individual examinations are too partial, and are liable to so many errors that their value must always be inferior to rigid general official ones, such as Major Tulloch has presented in his statistical reports of sickness, mortality, and invaliding in the army.

Notwithstanding all those acknowledged chances of error, I shall annex a table collected from various official sources, although it may not be so strictly correct as might possibly be made from a minute scrutiny of all official documents.

Table of an Approximation to the average strength of H. M.'s Regiments in the Fort of Bellary, from 1815 to 1838 inclusive; with admissions of disease, deaths, ratio of admissions, & ratio of deaths.

Years.	Average strength.	Total admitted.	Total died.	Annual ratio per 1000 of mean strength.	
				Admissions.	Deaths.
1815	757	892	38	1178.	50.2
1816	1494	1970	64	1331.	43.
1817	1092	2103	49	1925.	44.9
1818	1216	2481	112	2040.	92.
1819	186	186	5	1000.	27.5
1820	673	1296	45	1925.	66.7
1821	457	956	13	2091.	28 5
1822	502	986	13	1964.	25.9
1823	615	1154	23	1711.	37.3
1824	593	1633	38	2753.	64.
1825	398	1330	36	3341.	90.5
1826	572	2005	70	3610.	122.2
1827	425	1181	71	2543.	167.
1828	811	1750	63	2144.	77.7
1829	790	1582	12	2002.	15.2
1830	790	1271	17	1608.	21.5
1831	641	1558	53	2430.	82.7
1832	726	1135	16	1549.	22.
1833	741	1482	52	2000.	70.2
1834	653	1545	24	2403.	37.3
1835	794	1666	20	2098.	25.2
1836	824	1387	24	1671.	29.2
1837	896	1753	36	1956.	40.2
1838	704	1871	22	2656.	32.5
	17341	35173	616	2023.	52.82

Table of Admissions and Deaths, and the Diseases from which the deaths originated, with ratios of the sickness and mortality for the last 11 *years.* Total strength, 8360. Average annual strength, 760.

Diseases.	Admissions.		Deaths.		
	Total.	Ratio per 1000 of strength.	Total.	Proportion of deaths to diseases.	Ratio per 1000 of mean strength.
Cholera	213	25.47	92	1 in $2\frac{1}{2}$	11.
Fever	1980	236.84	34	1 in 55	4.06
Dysentery	1122	134.21	66	1 in 17	7.90
Hepatic disease	796	95.21	42	1 in 19	5.02
Thoracic do..........	202	24.16	26	1 in 8	3.11
Abdominal do.	156	18.66	14	1 in 11	1.69
Rheumatic do.	936	111.96	4	1 in 234	7.07
Syphilis	2568	307.17	4	1 in 642	.47
Diarrhœa	719	86.	7	1 in 101	.83
Apoplexy	7	.83	6	1 in 1	.71
Dropsy	18	2.15	4	1 in $4\frac{1}{2}$	.47
Wounds, &c..........	730	87.32	3	1 in 243	.35
Insanity............	10	1.19	1	1 in 10	.12
Other complaints	812	97.13	36	1 in $22\frac{1}{2}$	4.30
Diseases without deaths	6603	78.96	—	—	—
Total	16,872	20.18	339	1 in 50	40.55

Deducting deaths from cholera, the annual ratio of mortality among the men in hospital, per 1000 of strength, would appear to be 29.55 (viz. 40.55 minus 11); and I feel confident that, *profiting by sad experience,* a great deal may be done towards obviating the occurrence of cholera in this country on a march, in camp, and in garrison, by the selection of proper halting ground, changing the site of encampments *at once* when they become uncleanly or unhealthy, and giving plenty of space with scientific ventilation to men in barracks, which I have too much reason to believe are not always sufficiently attended to. This subject, however, merits the deepest consideration; humanity and policy alike demand it.

Dr. Davis and myself, as in duty conscientiously bound, reported officially at different times many circumstances which appeared to us *remediable* causes of disease among the men, for which, however, it appeared we got very little credit with the *local authorities;* but this we cared little about, as we found many *(most)* of our suggestions were ordered to be adopted from head-quarters, where it was most desirable they should be approved of and appreciated; and we took care that our reports should not be *burked* by the local authorities by always sending copies of them to the deputy inspector of hospitals, which I strongly recommend to H. M. medical officers to do with all such documents; indeed it is so ordered by the deputy inspector himself.

If by any means we could *avoid* cholera, and lessen the prevalence and severity of febrile, hepatic, and dysenteric diseases, by the erection of large well ventilated barracks outside the fort at the old dragoon lines, improving the guard-rooms and sentry walks, regulating the dress according to climate and season, obviating the drinking of unwholesome liquors, and increasing the comfort of the soldier's life, Bellary might become one of the favourable stations of India for the health of Her Majesty's troops.

CHAPTER V.

Observations on Cholera in the 34th Regiment of Native Light Infantry in the year 1837, by Assistant Surgeon J. Lawrence.

The general amount of sickness in the last half year would have been much less than in the preceding one but for the occurrence of cholera, which has made an addition of forty-three to the grand total, but still giving only six in excess of the last return.

Between the 16th and the 25th of May some suspicious deaths occurred among the followers in the lines of the 34th Regiment L. I., but it was not till the 25th that a case of cholera was reported to me, which I visited immediately. The man was in a state of collapse and died two hours after. These cases occurred to relations of sepoys, who had come in from the northern division about the 16th of May and on the two or three following days. A golundauze, who had been with Colonel Conway's party, and who arrived about the same time, was attacked and died the same day. These people had been travellers on the Masulipatam and Madras roads, on which line cholera prevailed at the time. The number of them attacked was eight, of whom four died.

On the 27th of May the first case in the regiment occurred to a recruit boy; the symptons were mild, and he quickly recovered. The following register will shew, from this date, the daily number of admissions, recoveries, and deaths amongst the "sepoys and followers treated in hospital,"—"sepoys placed under observation, who had the disease in a mild form,"

—" followers who merely applied for medicine," and " followers who died without medical aid." The men, women, and children attacked have also columns assigned them. The register may be considered accurate, the names of all those who applied for medicine being taken down at the time of their application, and the result in death or recovery being given in many instances by the relatives of the parties, and by the report of the havildars of companies, who were instructed to furnish the information. The lines of the 34th Regiment are perfectly isolated, being a mile distant from any other native corps, and about three furlongs from those of the golundauze, and unconnected with any other than their own regimental bazaar. A reference to the topographical account of the 34th lines, furnished by me in January, will shew their situation with regard to the malarious grounds in the neighbourhood, and judging from the locality, the position of the men's huts appears unhealthy.

The object of the table is to shew the degree of efficacy of medical treatment as compared with the inefficient treatment those probably received who remained in their houses, taking only an occasional dose of medicine, and with those who died without taking any. The result is favourable to regular practice and unremitted attention. As far as can be learned, no person who had the complaint recovered without applying to the hospital for aid.

Whilst I was stationed at Hoonsoor in 1833, a severe visitation of cholera occurred, and it was estimated afterwards that 500 persons had died out of a population of not more than 4000 or 5000. Those attacked used no remedies, and I could only find three or four of them who had recovered, though doubtless the number was greater. I treated only seven cases in hospital, and the deaths were three out of that number. The form of the disease corresponded precisely, except in the consecutive symptoms, with the one here recorded.

A reference to the table will shew the period at which the disease ceased in the regiment.

Register of Admissions, Recoveries, Deaths, &c. of Sepoys and Followers of the 34th Regiment, of C. L. I., attacked with Cholera between May 25th and June 30th, 1837.

Of the regiment admitted into hospital.	Recovered.	Died.	Followers admitted into hospital.	Recovered.	Died.	Followers receiving medicine.	Recovered.	Died.	Total recovered under medical treatment.	Total died under Medical Treatment.	Grand Total recovered.	Grand Total died.	Attacked. Men.	Women.	Children.	Grand Total of Attacks.
May 25..0	0	0	May 25..0	0	0	May 25.. 2	0	2	0	0	0	2	2	0	0	2
,, 26..0	0	0	,, 26..2	0	0	,, 26.. 0	0	0	0	0	0	0	0	0	2	2
,, 27..1	0	0	,, 27..0	0	0	,, 27.. 1	0	0	0	0	0	0	1	0	1	2
,, 28..1	0	1	,, 28..1	0	1	,, 28.. 9	0	5	0	2	0	7	1	5	5	11
,, 29..6	0	1	,, 29..2	2	0	,, 29..13	1	3	2	1	3	4	8	4	9	21
,, 30..4	0	0	,, 30..1	0	0	,, 30..14	2	4	0	0	2	4	3	8	8	19
,, 31..2	0	1	,, 31..3	0	0	,, 31.. 6	1	3	0	1	1	4	2	6	3	11
June 1..1	0	0	June 1..2	0	1	June 1.. 4	0	2	0	1	0	3	1	3	3	7
,, 2..4	2	0	,, 2..0	0	0	,, 2.. 5	2	2	2	0	4	2	4	2	3	9
,, 3..4	1	4	,, 3..0	0	0	,, 3.. 4	0	0	1	4	1	4	4	3	1	8
,, 4..1	0	0	,, 4..0	2	1	,, 4.. 5	9	4	2	1	11	5	1	3	2	6
,, 5..2	5	1	,, 5..0	0	0	,, 5.. 3	6	7	5	1	11	8	2	2	1	5
,, 6..2	4	1	,, 6..0	2	0	,, 6.. 0	4	2	6	1	10	3	2	0	0	2
,, 7..1	1	0	,, 7..0	0	0	,, 7.. 0	3	0	1	0	4	0	1	0	0	1
,, 8..2	1	2	,, 8..1	1	1	,, 8.. 5	0	3	2	3	2	6	2	4	2	8
,, 9..4	2	0	,, 9..0	0	0	,, 9.. 3	0	0	2	0	2	0	5	2	1	8
,, 10..1	2	3	,, 10..0	1	0	,, 10.. 3	0	1	3	3	3	4	1	1	1	3
,, 11..1	3	0	,, 11..0	0	0	,, 11.. 3	0	1	3	0	3	1	1	2	1	4
,, 12..3	0	1	,, 12..0	0	0	,, 12.. 0	0	0	0	1	0	1	3	0	0	3
,, 13..0	0	0	,, 13..0	0	0	,, 13.. 0	4	0	0	0	4	0	0	0	0	0
,, 14..1	0	1	,, 14..0	0	0	,, 14.. 0	0	0	0	1	0	[illegible]	1	0	0	1
,, 15..0	1	0	,, 15..0	0	0	,, 15.. 0	2	1	1	0	3	1	0	0	0	0
,, 16..1	2	0	,, 16..0	0	0	,, 16.. 0	0	0	2	0	2	0	1	0	0	1
,, 17..0	1	0	,, 17..0	0	0	,, 17.. 0	0	0	1	0	1	0	0	0	0	0
,, 18..0	0	0	,, 18..0	0	0	,, 18.. 0	0	0	0	0	0	0	0	0	0	0
,, 19..0	0	0	,, 19..0	0	0	,, 19.. 0	4	0	0	0	4	0	0	0	0	0
,, 20..0	0	0	,, 20..0	0	0	,, 20.. 0	2	0	0	0	2	0	0	0	0	0
,, 21..0	1	0	,, 21..0	0	0	,, 21.. 0	0	0	0	0	1	0	0	0	0	0
,, 22..0	0	0	,, 22..0	0	0	,, 22.. 0	0	0	0	0	0	0	0	0	0	0
,, 23..0	0	0	,, 23..0	0	0	,, 23.. 0	0	0	0	0	0	0	0	0	0	0
,, 24..0	0	0	,, 24..0	0	0	,, 24.. 0	0	0	0	0	0	0	0	0	0	0
,, 25..1	0	0	,, 25..0	0	0	,, 25.. 0	0	0	0	0	0	0	1	0	0	1
,, 26..0	1	0	,, 26..0	0	0	,, 26.. 0	0	0	1	0	1	0	0	0	0	0
Total..43	27	16	Total*..12	8	4	Total†..80	40	40	43	20	*83	71†	59	48	47	154

Remarks.—Those under observation had the disease, but it was arrested by timely treatment. The number was ten, of whom two were taken into hospital on account of the increasing severity of the symptons. These had the complaint very mildly and recovered. The remaining eight are added to the recoveries of those admitted into hospital.

* Eight sepoys and followers under observation not admitted.

† Eight followers died without medical treatment.

It was my intention to have made out a table shewing the relation of consanguinity and the probable degree of exposure to contact among those attacked, but as I found it could not be done with complete accuracy, I have preferred giving such facts as were established in the enquiry. The arrival of persons from the line of road on which the disease prevailed, their subsequently sickening in the 34th lines, and the disease then spreading exclusively in the regiment and among the followers, at first sight strongly favours the idea of its contagious nature, and, as will be seen in several instances, a number of cases occurred in the same family. The following table of the eight followers before alluded to, and the spreading of the disease in the families with whom they resided, all tend to strengthen the same opinion, but there are other and opposite facts to be noticed before arriving at such a conclusion.

Register of eight followers arrived from the northern division about 16th May, 1837, and attacked with cholera in the 34th lines.

Followers	Date of Attack.	Name of Followers.	With whom residing.	Persons attacked with whom they resided.	Date of attack to persons with whom the followers lived.	Interval between the attacked followers and those with whom they resided.
	1837.				1837.	
1	May 16	Paupamah	Recruit Boy Goorapah	Recruit Boy Goorapah and Tummiah	May 27 June 2	12 days. 18 ,,
2	,, 20	Seetamah	Bouber Jogie	Venkanah	May 30	11 ,,
3	,, 22	Seetamah	Bauliah	Bauliah and wife	,, 30 ,, 25	9 ,, 4 ,,
4	,, 22	Neeliah	Rajiah	Ramiah	,, 23	2 ,,
5	,, 23	Lutchanah	Venkiah	None		
6	,, 24	Pathyah	Goorapah	Yellamah and Goorapah	,, 29	6 ,,
7	,, 25	Soobadramah	Ramdoss	Ramdoss	June 4	11 ,,
8	,, 21	Camthamah	Ramiah	None		

Of five houses, three were attacked in each; of fifteen, two in each. Of the relatives and friends of those who had the disease, thirty-one were attacked. Of isolated cases, where no contact could be traced, there were fifty-five. The sick were attended by eighty-six orderlies, of whom two only took the disease. The medical attendants were seven, none of whom

were taken ill. Here we have facts of a striking and opposite order—the disease spreading through six of the families with whom the followers lived—the frequent occurrence of two or more cases in the same house, and the attack of thirty-one people, who, from being relatives and friends of those who suffered, may be fairly supposed to have come into occasional contact with the sick. Opposed to these, there is a numerical superiority in the numbers even of those equally, if not more, exposed to contagion, and a very great one, amounting to 148 if the isolated cases be added to the orderlies and medical attendants. At the first inspection of the register of the eight followers, contagion appears to be traced from them to the other parties mentioned in it; but a reference to the dates will show that in the generality of the cases a long interval occurred between the original attacks and the subsequent ones of the friends, and that these in the mean time, and whilst the disease was at its height, were exposed to all the atmospheric and other causes usually assigned for its production. It is, however, a remarkable fact that the disease should have attacked greater numbers in the houses where it first broke out, and that only two should have escaped. If it has been propagated among them from the original contagion, then it is curious to observe the different periods of from two to twenty days that it has taken to produce its effect. Cholera is not, like plague, obedient to the seasons and to temperature; it prevails at all periods of the year, and makes progress in hot and cold, in dry and moist weather. Were the two contagions similar in their mode of action, its ravages ought never to cease. If it be contagious, it is in so slight a degree that it requires great peculiarity and susceptibility of constitution to produce its effects; but I consider that we are in ignorance of its mode of propagation; and taking the superior numbers of those exposed to the disease and who escaped, I still adhere to the opinion that it is not contagious. I may here mention a fact that bears on this question. During the whole time the disease lasted, a party of about twenty Lascars was at work in the immediate vicinity of

the 34th lines and hospital, from the verandah of which I excluded them three several times when they had gone there to sleep in the interval of their work, and yet not one of them sickened.

The state of the weather since the 1st February has been variable and irregular with reference to preceding years and the usual course of the seasons. In March and April the fall of rain much exceeded the usual quantity of what is called the Mango showers; and on the 31st of March a violent storm of rain and hail of two hours' duration occurred, the quantity of rain as ascertained by the pluviometer being ·97. The hailstones were generally of from one-and-a-half to two inches in diameter, and some few were larger. The temperature of the last half of March and the first half of April was in consequence cool and unattended with the usual hot winds, which can scarcely be said to have been felt more than twenty days of this year. The following is the state of the pluviometer from March to June, and the mean of the thermometer from February to June in 1836 and 1837, by which the difference of the seasons and of their temperature may in some degree be estimated.

Pluviometer.				Thermometer.			
1836.		1837.		1836.	Mean.	1837.	Mean.
March	0	March	1·62	Feb...	82	Feb...	74
April .	0	April .	1·41	March	82	March	86
May..	0	May..	·19	April .	91	April .	90
June..	4·89	June..	1·35	May..	97	May..	94
				June..	86½	June..	92

The wind has been between W. and S. W. since the commencement of the disease.

The disease at *its invasion* has been generally what is termed mild, and has frequently been preceded by diarrhœa of seldom more than twelve hours' duration. When seen in the early stage, it was usually under control; but, if neglected, it passed rapidly into the state of collapse. Of ten men placed under

observation immediately after the first loose evacuation, and whose state appeared to require only an occasional stimulant combined with a small quantity of laudanum, though they all had subsequently either congee-like or discoloured flocculent stools, none died, and only two were taken into hospital, where the disease ran a mild course. The first man (not included in the ten), who was placed in the tent pitched for this purpose, and before a sentry was placed over it, had only slight diarrhœa, without an unfavourable symptom; he left it at 7 A.M., was brought to hospital at 10 A.M. in a state of complete collapse, and died a few hours after. The evacuations were not generally excessive, and the vomiting was chiefly produced by the taking of fluids and medicines. Cramps occurred, but they were by no means severe, being confined chiefly to the legs. Very few cases were admitted where the pulse at the wrist was entirely gone; and the collapse of the countenance varied much in degree with different individuals without reference to the intensity of the disease. There was less perspiration than I have seen on former occasions. The *evacuations* were congee-like, and when the disease was mitigated these gradually assumed a fæculent colour and consistence. The fæces were afterwards passed frequently and scantily. *The urine* was suppressed in almost every instance, the period of suppression varying from the period of the invasion of the disease to the time of admission. A few continued to pass it during the state of collapse, but very scantily. *The temperature of the tongue* was an excellent criterion of the disease; it was invariably cool or cold according to the approach made to collapse, and its returning warmth indicated the coming improvement of the other symptoms. The body and legs generally retained a moderate degree of warmth even in the worst cases; the arms, as being most exposed, were cold, and the perspiration was greatest about these, the neck, and chest. Convalescence was rapid in all those cases not followed by other disorders. At admission there was no apparent congestion of any particular organ, except in one instance, where the attack was sudden, and imme-

diately followed by loss of pulse with oppressed breathing. This case terminated fatally, as did another where this symptom arose in one apparently of a mild nature at admission. I do not recollect ever to have seen a person recover under such circumstances. No other instance of primary congestion occurred, and the intellects were in all unclouded to the last, though as usual they required to be roused before they would reply to questions. With the exception of a few children, who were delicate rather than sickly, those admitted into hospital were generally robust.

There are features in the occurrence of this disease that approximate it to cholera as it has appeared in Europe. I allude to the *premonitory diarrhœa* and the consecutive disorders. The diarrhœa was not of long continuance, but it was sufficiently so, when attended to, either to mitigate or prevent the graver symptoms of the disease, as in the instances of the ten men under observation. The consecutive disorders were fever and determination to the head or lungs. The former was slight and soon subsided. Of the second, three occurred (to men in the practice of using opium and bhang to excess), two of which terminated fatally. Of the last, three slight cases, which recovered easily. These complaints appear to have been prevalent among the followers, several having died after an interval of five or six days from the first attack. One child was brought into hospital on the 6th day, with all the signs of violent inflammation of the brain having taken place: she died the same day.

The view that I have taken of cholera is, that the morbific influence that produces the disease acts primarily on the nervous system, and chiefly on the great sympathetic and ganglionic system, and that the disorder of the vital and animal functions stands solely in relation of effect to this cause. This opinion is not founded on pathological examination, as I have had no opportunities for it, but from the pathological description of others, and my own observation of the train of symptoms from the invasion of the disease. A patient is attacked with diarrhœa;

there is some prostration of strength, the state of the circulation and skin being very little altered; the morbid condition proceeding, debility increases, and the character of the stools changes. The skin, though still warm, neither conveys the impression of the permanent heat that exists in health, nor of that pungent kind that occurs in fever; the pulse, even though it may be full and of its natural frequency, is extremely compressible. Should no remedies have been used, he sinks rapidly into a state of collapse, and then only is congestion, as that term is applied in this stage of the disease, established. This state is not apparently produced by excessive purging and vomiting, for in some cases of cholera they are not only moderate but almost wanting; and moreover they occur to as great or a greater extent and violence in other diseases without such an effect. The result rather appears to be the increasing morbid state and influence of the nervous, and particularly of the ganglionic system on the organs of the abdomen and chest. In proof of the extreme torpor that pervades the nervous system, and as regulating the actions of other organs,—a proof that this is the proximate cause of the disease,—I refer to an experiment that occurred in the practice of M. Majendie. "Two grains of camphor diffused in water and injected into the veins of a cat will make the animal bound several feet high, but in a case of collapse where ʒss of camphor was similarly injected into the veins not the smallest excitement was produced."* Derangement of function and irregularity of secretion cannot take place *per se*. In cholera there is no evidence of inflammatory action, but, on the contrary, its earliest invasion is attended with the reverse of these symptoms, as indicated by the pulse and skin, whilst the discharges are extremely irregular in their violence and quantity, and differ entirely from those occurring in inflammatory diarrhœa. The general absence of pain, and the short period in many instances in which this disease is established, are opposed to any idea of its inflammatory nature. This view

* London Medical and Surgical Journal, p. 586, vol. ii.

obliges us to look to a more remote cause, and to consider under what immediate influence the viscera are placed. The great sympathetic and the plexuses connected with it are the sources of their energy and healthy action. In cholera the general depression, the prostration of strength, the disturbance of the animal functions unattended by excitement, but accompanied by great irregularity of action, and the remarkable and rapid cooling of the body, all point to such a cause. Although the nervous torpor and the more prominent symptoms are apparently simultaneous in their further progress, yet the absence of any local lesion sufficient to cause death still makes us revert to the primary cause in the injury that has been inflicted on the nervous system, and this system I believe to be the one above-mentioned, because the effect is shewn chiefly in the organs under its control. It is true that the cerebro-spinal system does ultimately become affected, but it appears to be by communication with the ganglionic system. In the earliest stage of the disease spasm seldom occurs, or to a trifling extent only; the muscular power is impaired in a minor degree; and it is only when collapse has set in that any deficiency is observed in the cerebral functions: even then it is only to a certain extent, and the derangement of function is far less than in the viscera, since in general the intellectual faculties remain entire to the last, the party only requiring to be roused for their exercise. This fact is general and acknowledged, and I have received rational and correct answers to questions from a patient in complete collapse ten minutes before his death. The stagnation of the blood in all the viscera may contribute to keep up the state of torpor, but it is not the cause of it, for once rouse the nervous system and this state ceases. If the above be correct, then remedial measures should be applied chiefly to the excitement of that system, which from its torpor or morbid action appears to be the immediate cause of the more prominent symptoms of the disorder. This I have attempted by stimulants, blisters applied over the region of the solar plexus, and the general application of heat to the whole surface. It has been

urged that *venesection* acts as a stimulant by taking off the load of congestion from the nervous system; but though this is undoubtedly the effect with regard to congestion from ordinary causes, and when the arterial impulse is either strong or only slightly weakened, I doubt whether it can apply here, since the original and still acting cause in the morbid state of the nervous system continues in operation; and till that is counteracted, the state of the heart and vessels that induces congestion so called will continue. In Majendie's lectures on cholera, I find it observed that "in the extreme collapse of cholera the natural sounds of the heart cannot be heard with the stethoscope. Contraction of the ventricle may, however, still exist, and the circulation in the large vessels in the neighbourhood may be maintained, though in an irregular manner. Stagnation of the blood is of more frequent occurrence in the disease than congestion, and the distinction is important, as in the former there is an absence of arterial impulse."* What can more clearly point out an almost total annihilation of the functions of the nerves that supply the arterial system than such a state? Had the distinction between congestion and stagnation made by M. Majendie been more attended to, it would have been seen how futile must have been the attempts to relieve by venesection such a state of stagnation, so erroneously confounded with congestion. I have heard it observed that though bleeding will not always relieve the state of congestion, neither will stimulants always effect that purpose. But there is this difference,—that while stimulants are either inert, or relieve the state of oppression, or prevent the increase of the morbid state which induces the graver symptoms, venesection in the early stage, whilst the skin is warm and the pulse moderately firm, has induced, as I have practically experienced, immediate and fatal collapse; and in cases of collapse, when I have practised it, it has certainly not had any effect in rousing the system, and has rather appeared to hasten the fatal termination. The

* London Medical and Surgical Journal, vol. ii. p. 388.

quantity of blood, however, that I could ever obtain from a collapsed patient was very small. It has been urged that, though bleeding is not a remedy applicable to the native, yet it is useful in the European. Believing, as I do, that the primary and powerful cause of the disease is the disorder of the nervous system, and that the stagnation of the circulation is the result of this, and having seen, in more than one case in Europeans, immediate collapse produced by its use, I cannot accede to the opinion that a remedy injurious to one individual can be of benefit to another in the same pathological state, merely because he differs in colour, country, and physical power. In all other diseases do we not apply the same remedies to each, modifying them only according to the severity of the case and the acknowledged difference of strength in the parties? My chief reliance is on stimulants; but as in great collapse they fail in their effect, I had resolved to vary the practice, and had prepared a form for the exhibition of tartar emetic, when fortunately no more of such extreme cases occurred. Should I meet the disease again, I feel disposed in such cases to give it a fair trial, since its action has a powerful mechanical effect in impelling the blood. I have not found the use of stimulants followed by any unfavourable symptoms, or apparently inducing severe consecutive disorder, though such an apprehension exists with the practitioners in Europe, where these disorders from their greater severity have made them more cautious in their use. Although the effect of remedies is very doubtful in the state of collapse, yet their administration at that time is sometimes attended with great benefit, since, should slight reaction take place, they will assist it greatly. Their utility in the premonitory symptoms and the early stages of the complaint is such, that did persons generally apply at this period, the mortality would be much less. For an instance I refer to the men placed in the tent for observation.

Treatment.—The remedies that have been used in this disease have been,—the immediate application of a large blister over the epigastric region on admission, which generally rose well,

and appeared to have a more powerful effect in rousing the system than sinapisms;—the continued application of hot sand to the surface of the body and extremities;—turpentine frictions;—the use of three grains of calomel and the same of camphor, with a $\frac{1}{4}$ of a grain of opium occasionally combined, and a draught of ℨi of liq. ammoniæ, or ʒss. of æther with 6 minims of laudanum in camphor mixture every half hour or every hour according to the urgency of the symptoms: weak brandy and water for ordinary drink. In a few cases two grains of opium were given at once where the purging was excessive and the the pulse still continued, with a tolerable warm skin; for though it cannot be supposed that vomiting and purging constitute the disease, yet from experience I know, that where these have been excessive, collapse has been suddenly induced after their occurrence. In general I am no advocate for the use of opium in large quantities, as it does not appear always to restrain the discharges; and the torpor which it induces, even in the violence of the disease, is unfavourable to the action of the stimulants, whilst it leaves, after the severe symptoms have passed off, stupor, injected conjunctivæ, and some determination to the head. The object of giving calomel in small doses was with the view to its accumulation in the bowels and its ultimate action on the secretions, for it does not appear to have any immediate effect on the disease. The combination of assafætida and blue pill as recommended by Mr. Twining was used in a few cases. I consider that the use of purgatives in all stages of this disease ought to be very guarded, and I am in the habit of using them only when the pulse has become firm, the heat of the body well re-established, and when the congee stools have either become thicker or have acquired a fæculent colour. At the invasion of the disease, when the pulse is full and soft, during its progress when it becomes more compressible, and whilst the stools are congee-like and watery, if given, I have seen the purging much increased and such a degree of collapse induced as to oblige me again to have recourse to the stimulants. When the pulse becomes firm though small, and the stools

scanty and slightly fæculent, I have administered only ℥iii of castor oil, and it has had all the good effect that a more drastic purgative could have produced, causing fæculent stools without violent purging. After the bowels acted properly and the evacuations became natural, no other medicines were given. Half a drachm of carbonate of soda dissolved in ℥x of water was given as ordinary drink in all cases where the violence of the disease had subsided. In those cases of consecutive disorder, when determination to any particular organ occurred, it was met by the lancet, the application of leeches, purgatives, and saline medicines.

CHAPTER VI.

Account of Cholera as it appeared in His Majesty's 49th Regiment at Hazareebaugh in 1835, by James French, M.D. Surgeon.

The disease sprang up simultaneously among the Europeans, seapoys, barrack-people, camp-followers, and labourers. The latter were employed in the construction of private and public buildings carrying on at the station; and from information gathered on the spot, I have every reason to believe that the malady prevailed to a greater and more fatal extent among the natives than in the regiment; which may be accounted for, not only from their having no regular medical attendance, but from their being exposed all day long at their several occupations, and at night compelled to sleep in small huts, generally crowded to excess, from the immense influx of strangers required by Government for the completion of public works.

The first fatal case among the soldiers, at the commencement of the epidemic, happened to a man in hospital, originally robust and of regular habits, who at the time of the attack was in the convalescent ward after recovery from a severe and dangerous affection of the bowels. It is worth noticing that no fewer than seven patients under treatment for different diseases were seized with cholera whilst it prevailed, in several of whom it proved fatal.

The severe and uncontrollable nature of its attack under these circumstances may in some instances be attributed to the state of debility and exhaustion under which the patients laboured at

the time; but something must be laid to the account of the ill-protected state of the hospital wards, which doubtless contributed to produce a disposition in the men's constitutions to the disease, and likewise to call it into action at a period when they were unable to resist its overpowering effects.

With the view of obviating a wrong impression being given, I wish it to be clearly understood that the ward in which the greater number of cholera cases occurred during the epidemic was not the one in which patients brought from the barracks were treated. Had they happened in that part of the hospital appropriated for cholera patients, a contagionist might be disposed to lay hold of the fact as an additional proof in support of his theory.

In addition to what has been already mentioned by Mr. Robertson in his topographical account of the cantonment, I may observe that during the prevalence of cholera the hospital was not furnished with glass doors or windows, without which, to a building appropriated for the reception of Europeans labouring under sickness at a station of this elevation, or in fact at any place where changes of temperature are considerable and sudden at particular seasons, no fair or satisfactory conclusion can be arrived at in regard to a practitioner's success in the treatment of diseases incidental to the climate.

On the arrival of the regiment here in February last (1835), I was led to suppose that the malady under consideration had never prevailed epidemically at Hazareebaugh, and that the cases which had been accidentally met with by my informant during some preceding years were confined to pilgrims and travellers, who were supposed to have contracted the seeds of it in other districts through which they had passed, and that the disease did not develope itself until the individuals reached this. We are now, however, unfortunately, in possession of facts to shew that cholera has prevailed as an epidemic at Hazareebaugh, and I may add that it has seldom appeared any where with a more unconquerable character.

Several cases having at first happened among the soldiers'

wives of the left wing of the regiment, occupying the fourth barrack-room from the left of the lines, I was induced to recommend that half the families should be removed to a distant though unfinished room towards the other end of the line: and no case having occurred in No. 4 Barrack after this removal, renders it probable that the atmosphere had lost its morbific influence in that quarter before the change took place; as neither husband nor child of any of the women alluded to was seized with the disease, although the men must naturally and necessarily have been in constant attendance on their wives until the issue of the attack was decided in recovery or death.

On the 22d three cases were admitted from No. 6 Company, which at the period was quartered near to the north extremity of the range of barracks; two were recruits, the other an old soldier. The latter was suddenly taken ill when lying on his cot after having drunk too freely at the canteen; and when brought to the hospital his face was flushed, but the pulse at the wrist was scarcely perceptible. Thermometer 90°, wind easterly.

On the 24th there were several admissions; and in one man (Deane), although his face and extremities were perfectly livid, and pulsation at the wrist entirely gone, yet the heart continued to beat with great force, and he complained at times of acute pain in that region. The recti abdominis muscles were hard and tense, and as the patient lay on his back they had an arched form. On admission he was greatly alarmed, and the spasms were general and severe; but these were subdued by the use of calomel and opium combined, and the application of bandages to the extremities. He died, however; but for an hour or two before death he enjoyed comparative ease from his dreadful sufferings.

On referring to the medical register in which Deane's case is entered, I find the following remarks at the conclusion:— "There were several anomalous symptoms connected with the case, viz. a general convulsion which existed on admission; rather an increase than diminution of temperature on the sur-

face; the skin continued hot and dry to the last, and for some time after life was extinct; the great tension and arched appearance of the recti muscles; the violent action of the heart after pulsation at the wrist had entirely and permanently ceased; the muscles of the right hand and forearm continued in a convulsed state for some time after pulsation and respiration had ceased."

The father, mother, and sister of this lad fell victims to the same disease at Berhampore in 1829, when cholera raged to an awful extent in the regiment, shortly after its arrival in India from the Cape of Good Hope.

In another case which occurred about the same time as the above, the pulse at the wrist was full, while the action of the heart could scarcely be felt when the hand was placed over it. Thermometer 95°, wind westerly, thunder and lightning.

Most of the cases which happened about this period were found to run rapidly from the primary into the second stage, or that of complete collapse.

On the morning of the 25th there was a high wind from the south, which in the afternoon changed to the west: thermometer 89°. At this period the cases for a time were of a more controllable character, and the spasms less severe; but there was a prodigious discharge of fluid from the bowels.

It has not unfrequently come under my observation in India, that during the prevalence of spasmodic cholera violent storms of wind and rain have occurred, which for a time either entirely arrested or greatly mitigated all the symptoms of the disease: this was strikingly exemplified at Berhampore in 1829, when an epidemic of this disease was at its height.

26th. Several admissions, with profuse discharges from the intestines, retching, and sinking of the vital powers; but none attended with spasms of the extremities.—Thermometer 90°, wind southerly.

27th. Spasmodic cholera had ceased its attacks in the regiment for nearly thirty hours, when about 9 o'clock P. M. a soldier (Jackson), under cure for a venereal affection, was attacked

with the premonitory symptoms of the disease, followed by severe purging, &c. He did not make known his dangerous situation, however, until severe spasms and incessant vomiting had come on. When I first saw him the disease had arrived at the stage of collapse, with a perfectly pulseless wrist and other symptoms of a hopeless case, as ordinarily met with in this country. At 10 o'clock next morning the spasms had nearly ceased to harass him, but he complained of acute pain in the right side of the chest a little below the nipple. By friction with an opiate liniment the pain was removed; he languished till 2 o'clock, when he expired. Dissection did not throw any light on the case.

A very robust and fat young man (Edge) was brought from the light infantry barrack room, which stands on the extreme left of the lines, with the following symptoms:—"Pulse at the wrist gone; integuments of the fingers cold and shrivelled; purging excessive; trifling suffusion of the face and eyes; respiration considerably less hurried and oppressed than in the majority of the cases lately met with."

After administering medicine, and while I was standing by the bedside of this patient, closely watching the symptoms and progress of the disease, he suddenly shouted out that he felt an excruciating pain in the lower part of his belly, and in a fit of *indescribable* agony he tossed off the bed-clothes. On the body being exposed, I most distinctly saw what at the moment I conceived to be a spasmodic convolution of the small intestines, and something start suddenly up extending obliquely across the abdomen from the left to the right side. Smart friction soon overcame the pain, and the belly assumed its natural form. The man expired in the afternoon, and on examining the body a few hours after death the following curious appearance was observed:—"The omentum was twisted into the shape of a thick cord, stretching across the abdomen from the inguinal canal of the left side to its attachment to the colon on the right. On examining the canal it was discovered that the man had laboured under a small irreducible omental hernia, and that the

adhesions of the neck of the sac were so strong as to prevent the retraction of the omentum during a violent convulsive action of the intestines.

I may here remark that it is by no means an unusual appearance on dissection of bodies after a severe attack of spasmodic cholera to find the omentum drawn up to its attachment to the colon, and the small intestines consequently left uncovered. Had adhesion not existed in this case, the omentum would in all probability have been drawn up to the transverse colon.

28th. Wind easterly, atmosphere loaded with moisture. No fresh cases. Thermometer 76°.

29th. Weather cloudy and pleasant to the feelings—wind westerly—rain at 10 A.M. Thermometer 82°, at 3 P.M. No new case.

30th. Wind from the east. Weather continues cloudy—Thermometer 85° at 3 P. M. A fatal case happened to-day; the patient was taken unwell in the night.

Two dhobies belonging to the establishment were attacked with the disease at this period; one died, the other recovered. These are the only instances of cholera among hospital servants which have come under my observation during a residence of many years in India.

The coolies who were in constant attendance and in immediate contact with the sick entirely escaped, which I may be allowed to consider an additional proof to what I have already adduced in other reports in support of the non-contagious nature of Indian cholera. Out of 37 admissions in all we lost 10.

My treatment at this time differed but little from what has been already so often detailed in former reports. The more I see of this malady, the more am I persuaded that, in general, we are too officious in all its stages. Good nursing is of the greatest moment from the onset to the termination; and when patients do recover from a severe attack, I believe more is to be attributed to the kind assiduity of the attendants, and to the judiciously sparing use of medicine, than to the trial of a farrago of *every thing that can be thought of.*

Judging favourably of M. Velpeau's theory and treatment of

cholerine, I was induced to give a fair trial to the whites of eggs or *gelatine,* as recommended by him; but in no instance did the patients exclaim as M. Levacher's, "that the disease had left them as if by magic." Notwithstanding the want of success with it, however, I am disposed to think most favourably of gelatine and albumen in cholera.

I need scarcely remark that in many cases death seems *inevitable,* and that in others patients will recover by the administration of any medicine or no medicine at all; and if we took the trouble to inquire how practitioners have happened to be more successful in their method of treatment at a particular period during the prevalence of an epidemic than at another, doubtless it would be found that the disease had assumed a very different character. At one time the disease is not under the control of medicine; at another perfectly so. In this way particular remedies have got into great vogue for part of a season by professional men in every part of the world visited by this scourge; and perhaps some of them looked forward with a degree of anxiety for a fresh irruption of the disease, having implicit confidence in the discovery of a remedy for the malady which had baffled the skill of others in every country. When another epidemic, however, has appeared, these supposed specifics have been found as unavailing at its first breaking out as other remedies were in the preceding one; but when the malady has again begun to decline in the true sense of the word, another fancied specific is probably stumbled upon, which in its turn also fails on a fresh reappearance of the disease; and thus medical men go on from epidemic to epidemic, and from season to season, flattered with the idea of the discovery of *specifics,* when it is well known to every candid and observant professional man that cold water would probably be equally efficacious.

I would mention that dry cupping has been had recourse to with advantage in cases of local congestion, where bloodletting was considered inadmissible; and that I think in no case of spasmodic cholera should the application of bandages to the extremities be omitted, and I have found that neither internal

remedies nor other external applications so speedily or effectually relieve severe cramps.

My attention was first directed to the universal application of bandages from the circumstance that females during pregnancy and parturition are not unfrequently much harassed with cramps of the limbs, and well know how to subdue the painful sensation by tightening the garter below the knee. Preference should be given to flannel rollers when at hand, as they possess the quality of retaining heat on the surface much better than others; and precision in their application should be attended to.

In no two instances were the appearances on dissection found to be precisely the same, although during the career of the disease the symptoms might have borne the strongest analogy.

In some the lungs were found inflated and completely filling the cavity of the thorax; in others they were collapsed and contained little or no air.

The stomach and small intestines exhibited a pale colour in some instances; in others they were vascular and florid.

The omentum was found sometimes covering the intestines; at others retracted towards the transverse arch of the colon.

The gall-bladder was found distended in every post-mortem examination, except in the case of the lad George Armstrong.

The urinary bladder was almost invariably empty, and hard as a ball.

The colon and jejunum were frequently found covered externally with pellucid drops resembling dew, or, more correctly speaking, like the beautiful appearance usually seen on the leaves of the ice-plant *(mesembryanthenum crystallinum)*: it would seem as if this dew-like appearance escaped from the minute exhalents, when nature is struggling to relieve herself from internal oppressive congestion.

Health inspections took place at least twice a day during the prevalence of the epidemic, and the non-commissioned officers received strict injunctions to watch the men of their respective companies closely, and send them to hospital the instant they appeared to be in the slightest degree unwell.

CHAPTER VII.

Report on Cholera in the 13th Light Dragoons, by Dr. Mouat.

During the period embraced by this report there have been *two* visitations of cholera in the regiment; the first at Bellary, from 7th April to 27th May, 1839, in the right wing, under charge of Assistant-Surgeon Ferrier; the other on the march to the Presidency from 20th December, 1839, to 16th January, 1840.

The former, at least such notices of the disease as appear interesting, shall be given from Mr. Ferrier's report. He observes in his quarterly report, from 1st April to 30th June, 1839, that, "On the 7th March, 1839, the right wing of H. M.'s 13th Regiment Light Dragoons commenced its march from Bangalore towards Bellary, distance about 180 miles; during the march nothing of importance occurred; the men were healthy and in high spirits; only 12 cases were admitted into hospital, and six of these were accidents. The weather generally speaking was fine, but rather hot at times, with high winds and clouds of dust. Some refreshing showers of rain fell as we approached Bellary.

"On the morning of the 27th March the wing arrived at Bellary, and encamped on a flat piece of ground near the south gate of the fort and close to the high rock on which the hill fort is built. The weather at this time was excessively hot, and the heat reflected from the surface of the rock was very intense, rendering the evenings and nights close and sultry.

On this ground the detachment remained for five days, when an order was issued directing the dragoons to occupy the right-wing barrack of H. M.'s 39th Regiment, which had been previously vacated for their accommodation, both wings of the latter corps being put into one barrack.

" On the morning of the 2d April, at 5 A. M., the wing quitted its encamping ground and marched into the fort; the horses were also picquetted within the fort near to the east gate. Cholera was at this period prevailing epidemically in H. M.'s 39th Regiment, and some deaths had occurred.

" Seventy-one cases of fever were admitted into hospital during the month of April; 45 occurred in the fort, and 26 in camp, caused chiefly by exposure to the influence of a powerful sun. The distance from the barrack to the horse lines being between half and three-quarters of a mile, and the lines from the place of watering about a mile and a half, the men were exposed to the power of the sun at a very early hour in the afternoon, viz. 10 minutes before 4 o'clock, and also late in the mornings; added to which, when the wing went out for field exercise, the men had to carry their heavy saddles and accoutrements on their heads from the horse lines to their barracks after stables were over, which seldom occurred before 8 o'clock; nor could this be accomplished except by watering the horses previous to their return to the fort.

" On the 7th April two cases of cholera were admitted into hospital at midnight. One had been ill 11 and the other four hours previous to admission; both bad cases. One died on the following day; the other recovered.

" After this the detachment continued free from this disease for a fortnight, and great hopes were entertained that it had left us altogether. These were of short duration, for it re-appeared on the morning of the 20th. On that day three cases were admitted, one of which, after getting over the attack, died suddenly on the evening of the 3rd day, effusion having taken place at the base of the brain and into the ventricles. On the 22d, five more cases were admitted; two of these died

in a few hours, and the other three the following morning. On the 23d, three more admissions took place, and one died. On the 24th one was admitted.

" In consequence of the increasing sickness and great mortality, I made an application on the morning of the 23d for leave to move the wing out into camp; this was granted, and on the morning of the 25th, at 5 A. M., the detachment marched out of the fort, and encamped on a rising ground about five miles distant in a north-west direction. On the same morning four more men were attacked with the disease, all of whom recovered. On the 26th two cases, one fatal. On the 27th three cases; one died the same day; another on the 3d May, who, having shaken off the disease, sank under an attack of fever; the third recovered. On the 29th two cases, one fatal; on the 30th two more cases, one fatal. Thus, out of the 27 cases admitted, 12 died.

" In the month of May 11 cases were admitted and four died. There were also an officer and one European female attacked, but both recovered. On the 2d of the month two men in hospital, one admitted with fever and the other with diarrhœa, were attacked with cholera; these diseases were omitted to be changed in the monthly returns.

" It was very hot in the middle of the day in tents, and the sun very powerful at times; but the nights were generally cool, mornings always pleasant. There were occasional showers of rain. The camp ground was sometimes shifted, and the greatest attention paid to cleanliness. The prevailing diseases were fever, cholera, dysentery, and diarrhœa."

Mr. Ferrier goes on to observe :—" The fatal effects of this disease in the wing of H. M. 13th Light Dragoons at this station were most disastrous, sixteen out of forty-two attacked having fallen victims to its power. The disease generally commenced with sickness at stomach and looseness of the bowels, attended with a feeling of faintness, paleness of the countenance; small, feeble, and frequent pulse, and thirst. As the dejections became more frequent, the stools, from being of a

brown colour, were clear, thin, and watery, or mixed with white flakes resembling boiled rice. The pulse fell, became small, feeble, and frequent, and scarcely perceptible at the wrist. Thirst increased and became very urgent, the patient constantly calling for cold drinks, particularly water. The skin became cold and clammy. Cramps of the toes and fingers, at first slight, but afterwards more severe, extending up the legs and arms; the fingers were contracted. Voice weak and hollow, countenance sunk, with lividity round the eyes, and blueness of skin; giddiness, deafness, and ringing noise in one or both ears succeeded. Copious clammy perspiration followed, particularly about the head and face. The breathing in most cases was heavy and oppressed, with total suppression of urine, restlessness, tossing the legs and arms constantly about, and complaining of being 'so hot,' as they termed it, although the skin was icy cold.

"If a check was not speedily put to these symptoms, the patient soon sank under them. In some cases the symptoms came on suddenly with all their violence, so that the system never rallied, and the patient sank in from six to ten hours. In those cases again where the attack was more gradual, the symptoms were not so severe and the case was of longer duration. After twelve or twenty hours, in some cases, the vomiting and purging ceased, the pulse began to rise, clamminess wore off, thirst decreased, and the case assumed a somewhat more favourable appearance; and if the patient got beyond twenty hours, and the symptoms continued to decrease, hopes were then entertained of a favourable issue; but I never considered a patient safe until after he had passed urine freely, which seldom occurred until from thirty to thirty-eight hours. Although this was looked upon as a favourable symptom, yet the period of its occurrence was one of much anxiety, for it always occurred about the time when fever came on, and the patient required to be most attentively watched, the fever being of that ill-defined nature, which, if it was not speedily put a stop to, produced effusion into the brain and terminated in death. Ringing of

the ears or giddiness with a very hollow voice were symptoms always indicating danger; and if present at the first commencement of the attack, death almost invariably followed.

" *Treatment.*—The general treatment which has been followed was, an emetic consisting of pulv. ipecac. ℈i, ant. tart. gr. i, on admission; and if the case has not been of long standing, a full dose of calomel (℈i) with a grain or two of opium, according to the urgency of the symptoms, sinapisms to the epigastrium and calves of legs; and if there is much ringing in the ears or giddiness, leeches were applied behind the ears, and the liquor lyttæ was rubbed into the back of the neck, and a strong blister over it to secure good vesication. Calomel was given in ten-grain doses every second hour, with occasional draughts of weak brandy and water, or spirit. amm. aromat., spirit. lavend. comp. and mist. camphor. Cold water poured over the head afforded great relief, and was very gratifying to the patient's feelings; any appearance of febrile symptoms was met by the use of saline purgatives and tartrate of antimony. When the stools began to change their appearance, viz. from being watery and white to a leaden or brown colour, the calomel was omitted and the bowels acted on by moderate doses of rhubarb and magnesia or castor oil; the former was most frequently retained. Frictions were constantly used to subdue the cramps.

" Such was the general plan of treatment followed; but latterly I trusted more to external stimulants, blisters, and sinapisms, and thought them most beneficial, but no specific mode of treatment can be laid down; the symptoms must be combated as they occur, and it is only at the bedside of the patient that we can form our opinions as to what is best to be done, for similar cases often require quite different treatment. From the congestive state of the lungs found in those who died, I was at first led to form a favourable opinion of bleeding, but was disappointed in the result, for in all the cases in which it was tried no good effect arose from it, even although it was had recourse to in the early stage of the disease, and when the blood flowed

freely: only one case in which bleeding was tried recovered. I consequently abandoned the use of the lancet, and had recourse to leeches with better success.

" Emetics I think useful in clearing the stomach of any deleterious matter that may be lurking there; their operation also tends to excite the sluggish circulation, for I have been able to feel the pulse at the wrist during their operation, when it had previously been imperceptible and was not affected by the ordinary vomiting. Opium I think is injurious, except it be given at the very commencement of the disease.

" Cold affusion was found very serviceable; it was grateful to the patients to have their hands frequently immersed in cold water. Latterly I gave very little medicine internally; merely quenched the thirst, which was done by small quantities of weak brandy and water or plain water, for which there were almost constant calls. The patients were allowed to drink it *ad libitum*, and I did not perceive any bad effects from it; on the contrary, in some cases it appeared to soothe and allay the irritability of the stomach; soda water was also a very grateful beverage. On the whole I place more reliance on the use of external stimulants (blisters) than any other remedy employed, and free doses of calomel, and should have recourse to them on meeting with the disease again.

" *Dissections.*—The post-mortem examinations were nearly all similar, shewing great congestion, particularly of the lungs; the blood being very thick, black, and resembling tar in consistence. This was particularly the case when there was much oppression of the chest and difficulty of breathing. In some cases the blood was more fluid, but of the same black colour, when the disease had been of short duration. The stomach was more or less distended from the fluids which had been drunk; its coats were pale with rose-coloured spots here and there. The liver was generally congested and soft in substance; gall-bladder generally distended; in only one instance were bile and fæces found in the intestines. Spleen mostly congested, and soft in substance. Bladder always contracted and containing no urine.

In several instances effusion was found in the ventricles, also at the base of the brain."

The first attack is here circumstantially reported upon by Assistant-Surgeon Ferrier, H.C.S.; and it is due to that active and zealous officer, to state, that he meritoriously exerted himself in the discharge of the medical duties of the wing under his professional care on that trying occasion to the entire satisfaction of the commanding officer.

The following is a table of the second outbreak of the disease in the corps, and in an accompanying detachment of H. M. 4th (King's Own) Regiment, and among the camp followers, on the march from Bangalore to the Presidency.

	Strength at Starting.	Attacked.	Died.	Ratio per cent of attacks to strngth	Number treated.	Of those died.	Ratio per cent of deaths to treated.	Ratio per cent. of deaths to attacks in those not treated.
13th Light Dragoons.								
Men — Of those who had not been on service at Bellary.	320	98	35	30.6	98	35	35.7	
Men — Of those who had been on service at Bellary	208	27	4	13.	27	4	14.8	
Officers	14	1	..	7.1	1	..	..	
Women	69	7	3	10.1	7	3	42.8	
Children	112	28	12	25.	28	12	42.8	
4th Regiment.								
Men	33	6	5	18.1	6	5	83.3	
Women	9	2	2	22.2	2	..	..	
Children	31	1	1	3.2	1	..	..	
Followers — Who applied for medical aid, about	2700	23	8	10.	23	8	34.7	
Followers — Who did not apply for do		248	97		..	..	..	39.1
Total..........	3496	441	164	12.6	193	67	34.7	39.1

It is worthy of special notice, that out of the 125 men of the dragoons attacked, 98 were of the wing of the regiment which had remained stationary at Bangalore; while of the right wing, which was on service at Bellary, where it suffered from a severe visitation of cholera, only 27 were attacked on this march. The ratios of attacks and deaths in the two wings vary in a remarkable degree, as shewn in the foregoing table.

From the history of cholera, it appears to be more liable to occur, and to be more malignant in its type, in some localities than in others. At the time of its visitation in the right wing of the 13th Light Dragoons at Bellary, all the European troops quartered in barracks inside the fort, (viz. right wing 13th Light Dragoons, H. M. 39th Regiment, and a company of H. C. Foot Artillery,) suffered a dreadful mortality; while a troop of H. C. Horse Artillery, the only other European soldiers at the station, quartered in a barrack a short way outside the fort, did not lose a single man.

The disease first shewed itself among the dragoons on the march from Bangalore on the 20th of December, at Amboorpett and Gorriattum, where three men were attacked; and in two days thereafter it was prevalent throughout the camp, among the men, women, children, and followers, indicating the influence of its exciting cause to be general.

We are convinced that the selection of encamping ground for troops requires the most serious consideration, and that cholera may be acquired or nearly averted according to the bad or good choice of ground; but when once its poison has been imbibed the disease will have its course, although its power may still be mitigated and its dissemination greatly checked by removal to a more healthy situation.

To us it was at the time, and has subsequently been, a source of great regret, that the corps was, in the face of our representations, stationed on comparatively low and otherwise objectionable ground, close to swamps and paddy fields, at Coorumberpully, on the 14th and 15th of December. We had not only objected to the ground to Major Stones, who marched in the

regiment, but to the commanding officer on his arrival; previous to which we had pointed out superior ground to the acting quarter master near the hospital tents, and even sent assistant surgeon Dr. Nicolson to remonstrate with him about the spot he was selecting. This made us reluctant to interfere afterwards (until requested to do so after cholera had broken out), although the sites occupied at Malapaddy on the 16th, at Naturapully on the 17th, and at Vaniambaddy on the 18th and 19th, were also very ineligible. On the 20th, at Amboorpett, the regiment was encamped on the banks of a river, but no better ground apparently was to be had near this place. The days at this time were hot—thermometer 97°; the mornings and evenings cool; and the nights cold (thermometer 72°) with a heavy dew.

We should strongly urge the expediency of not leaving the selection of encamping ground to incompetent opinionated persons, or to those who are unacquainted with the country and with the places where the causes of disease are most likely to be encountered. Our view in regard to such selection, when practicable, is to fix on elevated, dry, clear spots, to the windward of tanks, swamps, &c.; an object easily attainable in a country where the wind generally blows six months together from nearly the same point.

The outbreak of cholera in the corps to such an extent was a source of great embarrassment to our limited means of carriage for the sick. Carts were of little use; they are very badly adapted for the conveyance of sick over Indian roads, and are, even to persons in health, extremely uncomfortable and unpleasant. Doolies in point of number and construction similar to those in Bengal should be furnished.

The whole of the Madras arrangements respecting camp equipage require to be revised, and placed on the more ample scale allowed in Bengal. The healthy men are too crowded in the tents; and those furnished for the sick will not hold, with any degree of comfort, the number allotted to them. The want of a dispensary tent was so much felt that we were obliged to appropriate one of those allotted to the hospital for that pur-

pose, thus depriving the sick of part of their already too limited room. The want of privy tents was much felt.

We consider it indispensable for the prevention of disease that blankets should be supplied to soldiers on the march at certain seasons and in particular lines of route. The cold of the tents at night has only to be felt by intelligent officers to render them fully sensible of its baneful effects: indeed cold and damp are the chief causes of fevers and bowel complaints in the camps of all armies.

After cholera broke out in the camp, it was in vain that we endeavoured to avoid it or check its progress by marching away from what we considered the place of its source; it continued to cling to us for twenty-seven days, for which reason I am strongly inclined to infer that its seeds may remain latent in the system for a longer time than is generally supposed.

It is usual in *epidemic* attacks of cholera to find that the character of the disease is very rapid and fatal on its first appearance, and that it mitigates in severity after some days or weeks, many cases then recovering under the same treatment which at first proved utterly ineffectual. In this visitation, however, the malady was nearly equally malignant and fatal throughout the whole twenty-seven days of its terrific reign.*

It was of the low adynamic type in every case. From the commencement of its attack there was a great depression of the vital powers, extreme feebleness of the heart's impulse, and diminished animal temperature. Dr. Murray, who visited our camp twice, has proposed that the term *adynamia algida* should be given to this disease, in place of that of *cholera.*

* Cholera appears to be an *endemic* of the part of the country about the bottom of the Ghaut leading to (or from) the Nackenairy pass, where the 13th Dragoons were attacked; and we strongly recommend that no troops should be marched by that route, but by Chittoor and Palamanair. The natives call the line of road at the bottom of the Nackenairy pass "*the Valley of Death;*" and regiments or detachments marched through it seldom escape cholera. Why, therefore, should the public road now constructing be made through this pass?—Ed.

The morbific agent seemed to attack the nervous system, the circulating powers, and the blood.

The ratio of mortality in the dragoons was 31 per cent. (about the same as in confluent small-pox); but I have to mention that thirty-three *invalids* of H. M.'s 4th (King's Own) Regiment were sent with us from Bangalore, and that of six of these who became attacked, five died, giving a ratio of mortality of 83 per cent.; which leads to the inference that weakly and sickly persons, *when attacked*, are liable to die in greater proportion than strong healthy subjects.

We have had no reason, however, to infer that weakly or sickly persons are more susceptible of the morbific impression of the cause of cholera than strong and healthy subjects. The invalids of the 4th (King's Own) were only attacked in the ratio of 18 per cent., while the ratio of admissions in the dragoons was 23.6.

Sudden failure of the heart's impulse was a very marked feature in this visitation; and one which, if hereafter attended to, may prove of great practical importance, both as to prognosis and treatment. This symptom was found in almost, if not invariably, in all the fatal cases. A most feeble cardiac impulse was indicated by the stethoscope, even in cases where the pulse continued to be nearly normal at the wrist.

This was well illustrated in a man admitted on the morning of the 4th of January, who stated that he felt low, weak, and oppressed. He had been only twice slightly purged, without vomiting. His skin was warm, and his pulse soft. Dr. Nicolson and Mr. Porteous thought it a slight case, and predicted a speedy recovery. However, on our applying the stethoscope, the heart's impulse was found to be nearly gone, upon which we drew an unfavourable prognosis. He soon got worse; coldness, violent purging, cramps, &c. rapidly came on, and in a few hours he died. Dr. Nicolson frequently referred to this case, and admitted the justness of our inference from this criterion.

Again, in a great many who had the disease, apparently in

its worst form, but in whom the heart's impulse continued strong, recovery was the result.

Hence we are led to conclude that where the heart's impulse fails much, death will ensue; where it is feeble, stimulants will benefit; and where it remains strong, while congestion is forming, bloodletting is indicated.

The stethoscope, therefore, appears a very valuable means of ascertaining the real condition of a cholera patient; and if our suggestion respecting the actual abnormal debility of the heart prove correct, the foregoing observations may serve to reconcile discrepancies respecting the effect of remedies.

We remarked that reaction was in many cases very partial, and that in the secondary stage of excitement depletion could be ill borne. This was another decided feature of the present visitation.

Although we endeavoured to keep the cholera patients separate from the others in the hospital tents, there did not appear to be danger from mixing them with the other cases, as tending to spread the disease: only two men in hospital were attacked.*

Though we do not deem the disease infectious or contagious, it is proper to state that it broke out in one village after the regiment had been encamped in its vicinity. This, however, might have been owing to other causes, for the diseased fol-

* A circumstance which excited a strong suspicion of the disease being contagious occurred about this time at St. Thomas's Mount. A pensioner who came from Bangalore along with the 13th Dragoons left their camp at Koratoor on the 6th of January, and arrived at the Mount on the 7th; and on the 8th he was attacked with cholera and admitted into the artillery hospital. On the 9th the first division of the 15th Hussars landed at Madras and marched to barracks at the Mount, the sick being received into the artillery hospital. The pensioner with cholera above mentioned was removed, with his bed and bedding, into an outhouse to make room for the sick of the hussars, and the patient who was put into his place was seized with well-marked symptoms of that disease in three days afterwards. I visited him with his surgeon; the disease was of the low type; and I recommended him a liberal allowance of beer, which was relished exceedingly. He recovered.—John Murray, M.D.

lowers must have communicated extensively with all the various hamlets in our route; yet only in this one instance was there reason to suppose that cholera was disseminated by us amongst the villagers.

The treatment may be truly designated empirical or routinal, —adapted to the ever-varying and rapidly progressive nature of the disease.

Generally, on admission, a scruple of calomel with two grains of opium was given; and, if much depression existed, a stimulant draught was at the same time prescribed of liquor. ammon., spirit. ammon. aromat., brandy, æther. sulph., and mist. camphoræ. If the first medicines were rejected, they were repeated a second or even a third time; and when retained, smaller doses of calomel, opium, &c. were given after every second or third discharge from the stomach or bowels.

For the vomiting, haust. efferves., mag. carb., with aqua menthæ ppt.; acid. hydrocyanicum; rubefacients, blisters, and sinapisms to the stomach, were used; as well as soda water and cold water, with or without brandy. For the thirst, some of the above drinks were given with cream of tartar, or one of the mineral acids; and beer and champagne were tried in some cases.

Bathing the temples and head with cold water, and dashing cold water on the head and face, were employed with a view to produce reaction, as well as hot saline enemata, sometimes with opium; also frictions with oleum terebinth., liniment. volatil., and sinapisms to the lower extremities; and in some cases tight bandaging was tried for the spasms.

When reaction and secondary fever supervened, bleeding and leeches were repeatedly tried; also cold affusion, in addition to blisters to the head and nape of neck, small doses of calomel, pulv. antimon., pulv. ipecac., mist. salina, purgatives, quinine, tonics, &c. &c. &c.

It would be important to give each medicine its equivalent of value or effect; but this, alas! is impossible, the intensity of the attack, the rapidity of the progress of the disease, and

the peculiarities of the morbid state of the patient, modifying so constantly and differently the action of every thing prescribed.

Bleeding seemed interdicted in every case; for when it was used, it apparently did more harm than good.

Cold affusion on the head did, in many cases, seem to rouse and produce benefit, and was generally grateful and refreshing to the patients.

But I think nothing proved more useful than friction for keeping up the circulation and inducing reaction.

The thirst, "the dreadful thirst," in this disease, was indulged according as it seemed to benefit or injure. In some patients every exertion appeared to exhaust and sink, and in such cases large draughts of any liquid seemed to hurry on the fatal event.

It appears from the profound ignorance in which we still continue respecting the essential nature of cholera, and from the continual changes occurring during its progress, that any more particular estimate we might attempt to give of the value or effect of the various remedies we employed would be conjectural; and we can only express our regret to have so very little positive information to give after all we have seen of this mortal disease.

In this country, where cholera occurrence is so frequent, and its effects so fatal, we cannot too strenuously recommend to commanding officers and surgeons of military bodies to be constantly on the watch, and never to relax their attention to all probable means of its prevention.

CHAPTER VIII.

Observations on Cholera, as it appeared in an epidemic form in the 2nd Madras European Light Infantry Regiment at Arnee in 1840, by Surgeon J. L. Geddes.

March.—The early part of this month was much cooler than the latter part of February. On the morning of the 4th an annular eclipse of the sun was observed, commencing about 7 A.M., and lasting for an hour. The morning chilly and dark; the thermometer at 8 A.M. being only 73° in the shade. On the 9th of this month the recruits were ordered to be restricted to the barracks between the hours of ten and four, to avoid exposure to the intense heat of the sun,—a judicious measure, which will, I trust, be the means of rendering the men free from attacks of coup-de-soleil, &c., which is a disease, I understand, of frequent occurrence here. On the 10th, weather again hot and oppressive, though the thermometer did not indicate a very great rise of temperature. 15th and 16th most oppressively hot and close; longshore winds set in about 12, and continued till 4 P.M. Detachment up to the 17th keeping remarkably free from sickness; hottest period of the day about 4 P.M.—difference between a room with tats of kuskus wetted, in comparison with that of a common room, 6°. 28th, 170 recruits arrived from Madras in good health. Venereal cases on the increase. No sickness amongst the officers, women, or children.

April.—The first few days of the month showed an increased temperature, and the nights until 3 A.M. sultry; for about two hours and a half, from half-past 6 till 9 P.M., a strong easterly wind prevailed, sea breeze! which is cool and refreshing, but

of short duration. Regiment, followers, and villagers still remarkably healthy. Tanks beginning to dry up. On the 6th the men coming into hospital with *diarrhœas and slight dysenteric affections, owing probably to eating too frequently of crude vegetables and unripe fruits, particularly the common mangoe, which abounds and is very cheap.* Venereal cases on the increase. On the 20th diarrhœas and dysenteries less frequent; it *has been* a species of epidemic, many of the officers and women being attacked. Weather now intensely hot, but the recruits generally very healthy. No deaths for upwards of three months and a half. Venereal cases still on the increase. Pandals are building round the barrack verandahs, and bathing-sheds for the use of the men are being established, which will eventually contribute to their personal comfort and cleanliness. On the 25th much sheet lightning over the range of hills in the north-west, indicative of rain in the vicinity. Nights now extremely sultry and oppressive. On the 26th strong land winds set in.

May.—The sun in the early portion of this week most intensely hot, and the men reporting sick in tens and twenties from lassitude, *pulmonary oppression,* and determination to the head. A sergeant died, after 12 hours illness, on the 2nd, from apoplexy occasioned by *coup-de-soleil.* Towards evening, at this period, the sky became overcast, with heavy squalls of wind and showers of rain in the distant hills; none except a slight sprinkling at Arnee. On the evening of the 3d every appearance of a storm; thunder and forked lightning, but little or no rain, except during the night, when a slight shower fell. The evening of the 5th cool and squally, with occasional rain during the night; the morning of 6th comparatively cool. Evening of 8th cloudy, squally, with whirlwinds of dust and strong gusts of wind; showery, but no heavy rain up to this date. On the afternoon of 9th clouds of dust and gusts of wind, ending in a refreshing shower of rain. 10th to 13th weather cooler. From 14th to 16th heat intense, especially between 4 and 6. One stout man taken ill and died of apoplexy on the 16th, a couple

of hours after seizure. Evening of 17th cloudy and cool, much thunder and lightning. 18th a slight gale from north-east and cool; forenoon hot, sultry towards evening, night most oppressive, scarcely a breath of air; men suffering from head complaints, with thoracic congestion and cardiac derangement, evinced by palpitation, &c. Night of 21st slight shower of rain. At 2 P.M. of 22nd a heavy squall of wind with rain occurred from the north-west, reducing the thermometer from 91° to 87° in the house, and 10° outside. On the evening of the 23rd cholera in its most aggravated form broke out; and, in the course of that night and morning of 24th twenty patients were admitted. The cholera, which raged with more or less violence from the 23rd to 30th May, disappeared as suddenly as it arose. After very sultry weather the station was refreshed with heavy rain on the evenings of 31st and 1st June.

Up to the latter end of April the whole regiment was in a remarkable state of good health. This immunity from serious disease is in a great measure attributed to the temperate habits of the men, among whom has been engendered a spirit of temperance, from a system enforced by the officer commanding the regiment, and willingly entered into by the soldiers themselves, beer, coffee, &c. having been substituted largely for arrack, the officers themselves setting an example.

Table showing the average range of thermometer for the months of March, April, and May.

	6 A.M.			12 A.M.			3 P.M.			6 P.M.			8 P.M.		
	Highest.	Lowest.	Average.	Highest.	Lowest.	Average.	Highest.	Lowest.	Average.	Highest.	Lowest.	Average.	Highest.	Lowest.	Average.
March	84	73	79	87	82	85¼	92	84½	88¾	87	81	84⅓	87	80	84⅙
April	85	75	77⅙	92	86	86½	96½	89	90	93	87	86⅓	93	86	85⅔
May	86	76	80½	95	88	91	97½	88	93½	94	88	90¾	92	85	89⅔

The 2nd European Light Infantry is formed (with the exception of 30 or 40 old soldiers who have been transferred from the 1st European regiment) of young lads, who have arrived from England in different parties since December last, the ages of the greater portion of the recruits varying from 18 to 24. They at present amount to 446, and have been stationed at Arnee since December, 1839. The men are, generally speaking, short statured, but most of them are necessarily not yet at their full growth.

Occasionally an instance of acute disease would present itself; but the sick list principally exhibited local cases, of which venereal diseases formed a prominent proportion. In the early part of May the weather, as is usual, became intensely hot, sultry, and oppressive, not indicated, as would have been expected, by much rise in the thermometrical scale, but by a peculiar sense of suffering in all exposed to its influence. Both officers and men complained of lassitude, languor, anorexia, pain of limbs, and oppression in head and chest. At this time the men were reporting themselves to me in tens and twenties, and most of them, in addition to the above symptoms, suffered from sinking or constriction about the præcordial region. At this time two men died from apoplexy; one an undoubted case of *coup-de-soleil.*

Matters continued thus, without any very material increase of the hospital list, until Saturday, the 23d of May, the whole of which day had been hot and oppressive in the extreme. In the afternoon the men, who were engaged in various games and gymnastic exercises (allowable on this day), were observed to be pale, out of spirits, and unwilling or unable to exert themselves as they were wont; and at 8 o'clock the first case of cholera was admitted; one or two others shortly followed, and then the cases occurred in rapid succession during the night, and during the two next days, Sunday and Monday. Thirty-three men were brought into hospital during the first thirty-six hours, all labouring under the disease in its most aggravated form. Fine stout lads were immediately struck down, weak, collapsed,

pulseless, covered with cold clammy sweats, lips livid, nails and hands blue, fingers and palms shrivelled, and the surface of the body discoloured. There were severe spasms in the extremities; the urinary secretion was suspended; the voice, which a few hours previously had been strong and vigorous, was now reduced to a hoarse whisper; and the man who rejoiced in the strength of his frame and the prospect of his days being "long in the land," was, to shew the vanity of all human hopes, reduced instantly to the weakest state imaginable.

It has been my professional fortune to have witnessed four times the outbreak of cholera, twice with natives and twice with Europeans; but I never before had the painful duty entailed upon me of witnessing, in so short a period, so many distressing and fatal occurrences. In little more than thirty hours we had thirteen deaths! and the wards appropriated for the severe forms of disease, and the greater part of the sick in hospital were literally, at first, horror-stricken. I speak within bounds when I assert that from the 23d to the 25th at least 100 men were seen by Mr. Parson and myself labouring under fear, which in many instances in my experience has proved a powerfully predisposing cause. In the majority of these cases the men were purged frequently, many vomited, and all more or less looked agitated, pale, complaining of fear, sinking about the stomach, as they themselves termed the feeling of anxiety, and with cold sweats, and small pulse. Timely stimuli internally administered, with hot brandy and water, and cheering their spirits as much as we had it in our power to do, prevented many a fatal case thus presented to us in its incipient and manageable stage. No men were admitted into hospital that we could possibly keep out of it, and we turned out as convalescents twenty men to remove them from the impression the melancholy scenes passing around were calculated to excite. Neither the officers' families nor women or children in the Patcherry were in a single instance attacked.

Every company in the regiment had some of its members attacked, and the greater proportion of cases throughout was

among the last batch of recruits; and with one exception (a man seized in hospital who had been admitted the night before) all our patients were seized in the barracks.

The above is a brief, and I trust in no respect an exaggerated, statement of what has taken place. The pestilence that struck us so suddenly as suddenly disappeared.

Remote causes, &c.—I have nothing to offer on this subject that could at all throw light upon this inscrutable disease. Like the blasting simoom of the desert, it creates desolation and dismay, and like it leaves little to dwell upon but the recollection of what has been. Providence, doubtless for wise purposes, has chosen to baffle the powers of human reasoning on the subject, and to show how little reliance can be placed on preconceived theory. Why a man here and there should be attacked when the whole regiment was equally exposed to the remote cause, whatever it may be, is beyond our skill to fathom. We were all alike under the influence of atmospheric vicissitude; how did any of us escape? The disease selects its victim without any reference to habit of body. The strongest and youngest men in the regiment were attacked, when the old and acclimated soldiers, with one exception, escaped. Concerning the contagious and non-contagious nature of the disease I would merely state the following observations, premising my belief that it is not contagious. In this epidemic, among thirty or forty people employed about the sick, not one was seized. With men of a superior grade, where excitement, the wish to do good, and other reasons existed for exertion, such causes might, and I think do, afford them security; but when we see a numerous body of coolies, &c. constantly imbibing the foul air generated in cholera wards, handling the men, removing their excretions, washing the dead bodies, and performing other menial offices, superadded to fatigue of body day and night, and none seized, we may unhesitatingly come to the conclusion that there is no contagious principle, and that the remote cause, whatever it may be, is still beyond our reach. We perceive from the effects that some powerful and highly concentrated

agent is at work, but as to the nature of this agent we are still in the dark. Its effects on the nervous system are very evident; the original cause of these effects is hid from us. In this part of my report I might advert to different circumstances connected with the location of Arnee, but I refer to a meteorological register, which I have kept since February, in which it will be observed my sentiments are recorded, unbiassed by any feeling of prejudice which might seem to be occasioned by recent occurrences. That a much better situation for a cantonment might have been made must be evident to every one who knows Arnee, which present and former experience alike points out to be a hot and unhealthy station.

Rationale of treatment.—The old system of treatment, viz. calomel and opium, (which I think the best when the medicine will remain on the stomach,) was at once had recourse to. On admission the patient had a scruple of calomel and two grains of opium, washed down with a draught containing mist. camphor. ℥iss., æther. sulph. ʒi, tinct. opii m. 50, spt. amm. arom. ʒi, in about half a glass of brandy; when rejected, repeated in from fifteen to thirty minutes, and continued as necessity indicated. Sinapisms were placed over the abdomen, nuchæ, spine, calves of legs, soles of feet, &c. Turpentine frictions were employed, with bottles of hot water and bags of heated sand. Liq. lyttæ was used in many cases (I do not think it was of good quality), and diluted nitric acid or liq. ammoniæ as counter-irritants. In others injections of muriate of soda were constantly used, but never retained, while in other cases turpentine and assafætida enemata were exhibited with as little success. The nitro-muriatic acid had a fair trial in twelve or thirteen cases, but with the other remedies proved ineffectual. Recourse was had to camphor and carbonate of ammonia, and acetate of morphia was also used. Bleeding was tried in one man who had a good pulse, and he recovered; but the utter collapse in others, where no pulse existed in the radial, brachial, or axillary arteries, and scarcely in the heart itself, warranted no hope of benefit from using the lancet. In fact, the men were

dying so rapidly, that bleeding, in my opinion, would only have accelerated their fate. Beer and soda water, well cooled, particularly the latter, were highly grateful, but like most other fluids rejected. Latterly the patients were not much restricted as to drink, and two or three cases recovered where the men drank *ad libitum.*

I may speak with somewhat more confidence of the cold douche as a remedial agent. Chatties of water were frequently dashed over the heads of the patients, and out of the cases in which it was tried recovery took place in twenty-two. In the other men it produced a surprising, though temporary reaction. In nine or ten it was not practised, and I am sorry it did not at first suggest itself to us. Several of the patients, who a few minutes previous to being placed under its influence appeared fast sinking and utterly prostrated, sat up in the tub, washed their faces, mouths, arms, and hips, expressed themselves greatly relieved, and were even jocular on the occasion; while the latter moments of the few who resisted its beneficial influence were made, I think, less painful. Immediately after removal from the bath, the men were well rubbed with dry cloths and covered with blankets, and a little warm brandy and water administered. The countenance became less anxious; skin softer and free from its clammy exudation; the peculiar and most disagreeable choleroid odour appeared checked; and there was established in a more or less marked degree a certain return of determination to the surface: the remedy acted so far well, and will, in my opinion, justify further trial. It has, I know, been ere now tried, and like all other remedies failed. A good shower bath or two would be an excellent appendage to hospitals.

In the approach to convalescence we were obliged to be wary of the exhibition of stimulants or strong medicines; and where there was a great craving for food, arrowroot, sago, milk, broths, jellies were used. At this period irritability of stomach predominates; in the former stage (collapse) functional atony of the nerves of this organ exists, and a subacute gastritis is formed. In a good many (12 or 14) of the cases in this stage of the

disease (convalescence), after continually vomiting the fluids they had taken and large quantities of bile, the irritation of the stomach was quieted by drinking chocolate—luckily procurable for them here. This rich nutritious diet, I had, from personal experience in many fevers I have recovered from in India, found was the first food I ever craved for or relished, and on the strength of this recommended it to my patients; it was at first greatly relished, and in the plurality of cases retained.

The last case which occurred, the subject of it an old soldier formerly in a Highland regiment, the right-hand man of the corps, and a fine manly robust person, who had a very severe attack, derived much benefit from the douche and a bottle of champagne. Convalescence was speedily attained in many of our cases, while in others great debility remained for a considerable time.

It is a curious fact, and perhaps worthy of observation, that the secretion from the kidneys was re-established in two or three men who died, urine being voided abundantly; the subjects were likewise under the influence of mercury. The stage of collapse in these cases had been recovered from.

The appearances on dissection afford us no clue to the discovery of the original cause of the disease. We see congestion more or less marked in the head, lungs, heart, liver, spleen, and kidneys; but these are effects, and incidental to many other forms of disease. In the few subjects that we found leisure to inspect, there were absolutely no remarkable lesions or morbid changes. The only three dissections which press of duty would allow us to make are forwarded with this report.

In concluding this slight sketch of the *mort de chien*, (which on this occasion it may so justly be denominated,) penned immediately on the subsiding of the attack, I may be permitted to remark that I have endeavoured to give a succinct and faithful detail of what has passed.

Since the disappearance of this disease the men have been removed at night from the barracks into tents pitched in an open esplanade within the fort. By this measure they enjoy a com-

parative change of air, have the chance of refreshing nights, and the barracks are better ventilated, &c. The type of the disease has recently changed, and slight fevers, dysenteries, and bilious attacks attended with vomiting and purging are presenting themselves.

Case 1. *Thomas Filby, Private,* æt. 26. Post-mortem examination seven hours after death. Venous congestion of the surface disguised by natural darkness of complexion; excessive venous engorgement of right side of heart (itself of ordinary size and healthy structure) and lungs generally; right lung posteriorly and near its root, to the size of a small orange, hepatized, tubercular and firmly adherent by short thick bands to the thoracic parietes; liver of ordinary size, mottled exterior, remarkably firm structure, and congested; gall-bladder flaccid, not more than half filled with bile; stomach, intestines, and omentum inordinately vascular; interior mucous coat of stomach ecchymosed towards pyloric extremity,—contents dark fluid; intestines greatly distended with the same fluid, tenacious mucus, and wind; urinary bladder empty and contracted; kidneys of ordinary size and distended with black blood; spleen double the average size. No further examination took place.

Case 2. *James Lawder, Private,* æt. 22. Post-mortem examination four hours after death. Features sunken; surface of body sallow, shrivelled, and harsh; heart unusually large, its right side containing black blood and a considerable mass of colourless fibrin; no fluid in pericardium; lungs neither unusually distended nor unhealthy; liver of common size and appearance; gall-bladder tense with bile; stomach thickened, empty, contracted, and interiorly ecchymosed; small intestines bright red externally, internally pale and smeared with a crocus-yellow mucus; large intestines and peritoneum congested, the former containing a brownish fluid; spleen very small and firm; kidneys betraying evidence of congestion; urinary bladder empty, contracted, and sunk within the pelvis; head unopened.

Case 3. *James Symes, Private,* æt. 26. Post-mortem examination five hours after death. Collapse of features and lividity of surface more remarkable than in the other cases; the thoracic and abdominal viscera shewed departure from their healthy structure; excessive congestion existed throughout; the gall-bladder was full; the stomach and whole alimentary canal contained a dark coloured fluid; urinary bladder empty and contracted; head unopened.

CHAPTER IX.

Observations on Cholera at Bellary in 1832, by Dr. Henderson.

The weather, from the beginning of the quarter to the end of January, was cool and pleasant, but very early in February the thermometer began to rise, and it has been extremely hot ever since, with the exception of two days at the close of last month, and from the 9th to the 15th of the present, during which we had heavy rain accompanied with northerly winds. Throughout the quarter there has been at times a good deal of thunder, and for the last two months I may say scarcely a night has passed without our observing frequent flashes of lightning.

In several of my former reports I had occasion to remark that this state of the weather seemed to me favourable to the production of cholera; and I have now to observe with regret that during the last two months this fatal malady has been very prevalent in the district. I believe I am correct in stating that it first made its appearance in the 45th Native Infantry while they were on their march from Kolapoor to Madras, and moved along with them, infecting every village they passed through. On their approach they were directed to avoid this station; and precautionary measures were taken to prevent, as much as possible, their communicating with our bazars. On the 1st of February they reached Courtney, (a village about twelve miles from hence,) where a number of fatal cases occurred; and from what followed, it would appear the disease was brought from thence to Bellary, for during the succeeding day several cases

were reported to have occurred in the neighbouring bazars among individuals who had communicated with the camp. From this period it extended all over the bazars, and at one time ten and twelve deaths were reported daily; I have even heard of as many as seventeen in one day. In about a fortnight after its appearance the disease began to subside a little, but cases are still occasionally occurring; no later than yesterday I heard that three deaths had occurred from it in the cooly bazar.

The moment the disease was found to have reached Bellary, the only precautionary measures which could be pursued to prevent its gaining access to the barracks were instantly adopted. Every thing was done that could be thought of to relieve the men from that dread of the disease which too often induces them to run into excess; it was clearly pointed out to them, that so far from being protected from its influence by the free use of ardent spirits, nothing was more likely to excite it where a predisposition existed. They were ordered to avoid the use of toddy, and in short to be extremely careful in regard to what they eat and drank; they were also particularly enjoined to avoid the bazars in which the disease was known to exist. How far these precautionary measures have contributed in warding off the disease from us I shall not presume to say; but it is a singular fact that only one soldier of the corps has been attacked, although we have been surrounded with the disease for nearly two months.

I shall not pretend to assert that cholera is of an infectious nature, still I must say we occasionally meet with the disease under circumstances which rather favour a belief that it is so. In the present instance we find it breaking out in a corps on the line of march; it continues with them for several hundred miles; they are found sowing the seeds of the disease in every village they halt at, and even communicating it to others by intercourse—for instance, Bellary; in proof of which I can safely assert that not a single case had occurred here until the 45th Regiment were communicated with at Courtney, and,

farther, that the disease had not been met with at Courtney prior to the arrival of the corps at that place.

I may here notice another very remarkable circumstance which is well calculated to induce us to think that the disease may be communicated under certain circumstances. An officer of the 13th Native Infantry, travelling with his family from Belgaum to join his corps at Cuddapah, arrived at Courtney immediately after the 45th Regiment had left it. The bodies of five individuals who had died the preceding night were left on the ground close to the bungalow, and were not interred till about noon. During the whole of this period his followers were exposed to the wind which passed over the dead bodies, they having accidentally taken up their position to the leeward of the ground on which the bodies lay. In the evening the officer came on to Bellary, and took up his abode at the house of a friend, who pitched two tents in his compound for the accommodation of the followers. The succeeding day all of them seemed in perfect health, but early in the night cholera made its appearance; and in the course of two or three days no less than nineteen were attacked, seven of whom died. The officer at whose house they were naturally became a good deal alarmed; and as he had been long impressed with the idea that the disease was of an infectious nature, he gave particular directions to his own people not to communicate in any way with the tents; and there is reason to believe that his instructions were attended to, for not a single case occurred among them although they occupied huts which were not above 100 yards apart from the tents. It is to be observed, however, that the huts were to the windward of the tents, which may have had some influence in protecting their inmates from the disease. As soon as the circumstance which I have here related was made known to General Fraser, he ordered the officer to quit the cantonment and to take his followers along with him, which he did immediately, although several of them were at the time labouring under the disease, and probably added to the list of casualties. On their quitting the compound the tents were struck, and I have reason

to know that not a single case of the disease subsequently occurred in it, or any of the adjoining ones.

It is not my intention just now to do more than to state facts connected with the present visitation of cholera in the district.

About the middle of the monsoon spasmodic cholera made its appearance among the native inhabitants around us. One case appeared in the corps, the subject a married man who had been invalided from this country in consequence of liver complaint, and returned three years ago with that organ enlarged and indurated. The case occurred before I was aware of the existence of the disease among the natives; but as soon as the circumstance became known to me, I had all our married people living out of barracks immediately ordered in, and the men of the regiment were advised to have as little intercourse with the affected parts as possible. This arrangement and caution, I am inclined to think, proved beneficial, for although many deaths occurred amongst the native population, not another case appeared in the regiment. The two native corps then in garrison, and at the time under my own care, were equally cautioned, and, I am happy to say, remained exempt from the disease. From all the information I could collect from the native doctors and others, it appeared that the state of the weather, the high price of food at the time, and its inferior quality, contributed much to the production of the disease. Many were attacked after eating " cat fish," which is a coarse species of fish seldom used, although in great abundance, except when other food is scarce or high priced.

While noticing this disease in a general way, I may be permitted to introduce a circumstance which occurred on a former occasion prior to our reaching Cannanore, as it appears to me to shew in a marked degree, not only the effect of the mind on disease, but what may be done occasionally by a little judicious management when cholera does make its appearance in a corps. On the morning of the 1st of January we marched from Manantoddy to Peria, a distance of about fourteen miles. The only ground we had to encamp on was extremely limited; and as we

were to halt the following day, I decided on moving forward with my hospital until I came to a more suitable place. This I did after giving the men their breakfast, and succeeded in finding excellent encamping ground within three quarters of a mile of the head of the Peria Pass, distant from the corps about three miles. In this position we remained for the night. At an early hour next morning the right wing was moved forward to assist the baggage down the Pass; on reaching the ground where I was encamped with my hospital, their arms and accoutrements were piled, and at daylight they proceeded to their work. About this time two men were brought into hospital labouring under symptoms of cholera, but in a slight form. In about two hours afterwards two more were brought to the tents in a similar state; and by nine o'clock I had a note from my assistant, who was in rear with the left wing, reporting that two men had been attacked in his camp with "spasmodic cholera," and were both seriously ill. I instantly mounted my horse and proceeded to Peria. On my arrival I found both the cases had been relieved by the remedies which had been employed, but a look of alarm was visible in every countenance. Being fully aware from former experience what would be the result if the men's minds were not immediately relieved, (for the soldier unfortunately always looks to the bottle for relief under such circumstances,) I resolved to put a bold face on the matter, and try what was to be done by declaring the disease to be common cholera. This I accordingly did, and assured them it was a disease unattended with danger unless to men suffering from the effects of intoxication. I stated to them at the same time, that as the ground on which they were was bad, I would immediately apply to the officer commanding to have them moved on to the top of the Pass. This fortunately had the wished-for effect; every countenance instantly brightened up, and the whole camp immediately became a scene of bustle and mirth. The commanding officer was kind enough to attend to my wishes on this occasion, and the wing was put in motion as soon as practicable. During the day five additional cases were

dmitted, making a total of eleven. Decided symptoms of " spasmodic cholera" were present in all, but with the exception of three cases the spasms did not extend beyond the fingers nd toes, although in every instance the stools were of a congee ppearance, the countenance well marked, and there did not ppear to be any secretion of urine until the patient was reeved. Fortunately the whole of the cases speedily terminated ivourably; and as I noted the disease in our returns " bilious holera," the dread which it at first excited speedily subsided, nd I am happy to add we saw no more of the disease.

CHAPTER X.

Reports on Cholera in H.M.'s 4th (King's Own) Regiment for the years 1840 and 1841, by Dr. Parry.

I have reserved for the present section the observations I have to make on this disease, as it prevailed in the regiment in the months of October and November, although aware that its limited ravages at the period alluded to cannot with strict propriety be regarded as *epidemical;* on the contrary, indeed, this extraordinary and fatal disease has evinced so singular a predilection for the locality of the lower fort of Bellary, where the Queen's troops are stationed, as never to have been wholly absent from it for a single year since its first appearance at the station, so that it may now be considered as indigenous, and as justly entitled to the designation of *endemic,* as remittent fever, dysentery, or any other disease peculiar to the station.

Its visitation was first manifested in the regiment on the 17th of October, and the following table will show the extent of the admissions and deaths from the disease as well as the different localities where the attacks took place.

Where attacked.	Men.		Women.		Children.		Remarks
	Adm.	Died.	Adm.	Died.	Adm.	Died.	
Right-wing barracks—Fort	3	1					
Left-wing do. do	3	2					
Main guard	1	1					
Patchery	0	0	2	2	1	1	
Camp near the hospital	3	1					
Garrison hospital	5	4					
Total........	15	9	2	2	1	1	

On the 19th of November it is reported "two decided but controllable cases were brought from camp." This terminated the visitation of the disease in the regiment.

It may be necessary to state, however, that although the disease discontinued its attacks in the corps at this period, it did not entirely disappear from the station; on the contrary, it now suddenly showed itself, and, for the first time on the present occasion, in the lines of the native troops; but it prevailed only for a few days, and was limited to a few isolated cases, mostly of a controllable character, and principally among the followers. Very few deaths occurred.

We may now proceed to notice the principal features in its character; and of these, sudden and extreme depression of the vital powers, a feeble state of the circulation, and diminished temperature of the body, cold clammy sweats breaking out in large drops about the head and upper part of the trunk, may be considered the most prominent, as they were almost invariably present in every case that was admitted. The vomiting and spasms were seldom severe, and soon subsided; the purging was of longer duration, and the discharges were in most instances copious, watery, and flocculent, but not attended with griping. There was generally extreme inquietude and intense thirst; but "the burning pain and uneasy sensation at the præcordia," noticed by Mr. Orton as a constant attendant on the disease, was very seldom observed; in the few cases where it was present the vomiting and spasms were also more severe, and they all seemed to manifest some power of resisting the morbific influence still existing in the constitution. The cessation of the vomiting and spasms was watched with much anxiety, for if there was not at the same time a manifest improvement in the state of the pulse, fatal collapse was sure to follow, and was generally attended by stupor, but seldom by complete coma. In the few cases that recovered, this event took place very gradually without any reaction; this last only occurred in one case, a patient in hospital. With regard to the secretions, both the urinary and biliary secretion were almost invariably

and very early suspended; and when recovery took place, the former was generally the first to be restored, the functions of the liver not returning in some cases for three or four days.

The treatment was in some degree modified according as various circumstances presented themselves, but I may state that it was generally stimulant, and that bleeding was strongly contra-indicated in every case by the depressed state of the system, and was consequently never had recourse to. A scruple dose of calomel, combined with two grains of opium, was given on admission, followed by a draught of ammonia, æther, and camphor mixture; and the draught was repeated according to the degree of depression, which was always more or less present. If the stomach continued irritable, it was alternated with saline effervescing draughts combined with some aromatic tincture, or more frequently with soda-water and a little brandy, and the calomel bolus was repeated. Calomel was afterwards prescribed in small doses, with a quarter of a grain of opium at different intervals in the progress of the disease, with the view of arresting the intestinal discharges; but opium under any form, however, was sparingly used, and never when once the irritability of the stomach subsided. The various other stimuli were tried in combination, or more generally with the above draught; *but ammonia was the stimulant which was chiefly relied on,* and given in frequently repeated doses proportionate to the diminished sensibility of the stomach: *its effects in rousing the depressed vital energies were in two or three instances strongly manifested.* Subsidiary to the internal treatment, were the external employment of rubefacients, blisters to the spine and stomach, terebinthinate frictions, mustard cataplasms to the epigastrium and calves of the legs, bandaging the legs, hot sand bags to the feet, and stimulating enemata. The cold affusion to the head, with the view of exciting reaction, was also employed, and in some instances it certainly seemed to rouse the patients for the moment; but its effects were never permanent, and in one or two cases it appeared to be of dubious efficacy. In the first three cases a fair trial was given to the

saline enemata, and their effects were watched with great anxiety, but, I am sorry to say, they signally failed in all; and however beneficial they may prove in the less intense forms, where there is but little depression, in the collapsed stage of the more malignant disease they appear to be perfectly inert.

The Ceded Districts throughout have been severely visited by epidemic cholera during the past year, so much so, indeed, that scarcely a village has escaped its ravages. Troops also, whether stationary or on the line of march, have been equally obnoxious to its attacks; and the mortality amongst all classes has been truly awful; but on no class, however, has the withering impression of this instructable pestilence left deeper or more melancholy traces than on Her Majesty's 4th Regiment stationed within the fort of Bellary.

In detailing the history of its progress in this regiment, it will be necessary for me to refer to three distinct periods at which the pestilence successively appeared; viz., in the month of April, in the months of July and August, and lastly in the months of February and March, when it committed fearful ravages.

During the first half of the month of April, sickness to a very great extent prevailed in the regiment, to which two powerful causes contributed. In the first place the weather, from the commencement to the middle of the month, was intensely hot; the thermometer ranged between 92° and 98° in the shade, and rose as high as 130° in the sun; the atmosphere was clear and unclouded, and the sun's influence quite overpowering; while, from three in the afternoon until sunset, there was an oppressive stillness in the air most distressing to the feelings, and which was only interrupted by hot scorching tornadoes, more oppressive, if possible, than the previous stagnation. In the second place, at this very unseasonable period, a large sum of money was unfortunately distributed among the men by way of compensation for clothing, which afforded them the means of indulging largely in arrack; and, in consequence, drunkenness prevailed among them to a melancholy extent, under the combined effects of which, and the intense heat of

the weather, the prevailing diseases became more numerous, and several of them assumed a severe character, more especially fever.

On the 12th the low adynamic case of fever, noticed at the commencement of the report, was admitted; and on the following day there were two sudden deaths out of hospital, evidently from the effects of high atmospheric temperature alone. One of them was a remarkably strong robust soldier, who had but lately arrived in the climate; he formed one of the detail of the hospital guard, and was apparently in perfect health about noon, when he was observed by his comrades to go and lay himself down on his cot in the guard room; here he was allowed to remain unmolested until it became his turn to mount guard about four in the afternoon, when he was found quite speechless, his face bloated and livid, respiration stertorous and laborious. He was immediately conveyed to the hospital, but died in the course of a few minutes. The other was found dead in the patchery on the same evening.

On the 14th, the day after these events, a fatal case of cholera was admitted; and between this and the 20th six other very decided cases, but of a controllable character, came under treatment, after which the disease suddenly disappeared and did not revisit the station until July.

I have in the foregoing detail considered it necessary to draw attention to those causes that appeared most influential in inducing disease at this period; as I think that the developement of cholera in the regiment, at a period when not a single case of it existed in any other part of the station, may be legitimately ascribed to the operation of the same causes, and if so, the fact is important, inasmuch as it goes far to shew *that the seeds of this pestilence are permanently sown in the locality of the fort of Bellary*, ready to spring into activity under every favourable circumstance. The predilection of cholera for the locality about the fort and the Cowle bazar and pettah, as noticed by assistant surgeon MacGregor, in his excellent report on this disease,*

* See Chap. IV.

was strongly exemplified in the recent epidemic visitation; for while the disease prevailed to a fearful extent in these three places, the native troops enjoyed almost a complete immunity from its attacks, although distant only about a mile and a half to the westward. These troops, it may be also stated, rarely suffer to any extent from the fever which during the latter period of the year is so prevalent in these places, both among the native population and among the European soldiers; and this exemption not only affords a striking proof of the extreme insalubrity of the locality of these places as compared with the native lines, but clearly indicates *that the causes of this insalubrity have a local origin,* although it may perhaps be difficult to point out the sources whence they emanate.

I may in this place notice the connection which appeared to me to subsist between cholera and that low pernicious kind of fever described in my former report as prevailing with this pestilence, and which seemed to usher it in in the present instance. This form of fever presents in its course many of the characteristic phenomena of cholera, terminating, like it, in watery discharges from the bowels, followed by general collapse; and although not quite so rapid in its progress, it is almost as fatal. Whether the morbific agents in which they originate be the same in kind and differing only in degree of concentration, or whether the choleraic miasm supervening on that of fever impresses on the latter the choleraic character, I know not; but certainly both diseases at this station invariably appear in the same locality; and whenever this form of fever presents itself, cholera is never far distant and may always be looked for.

Towards the latter part of June cholera was reported to prevail to some extent in the northern part of these districts, more especially in some villages situated near the Toombuddra river, from whence it gradually advanced along the principal lines of intercourse towards Bellary, invading in its progress one village after another in succession, until in the first week of July it reached this station, where it showed itself at one and the same time in the native pettah and the Cowle bazar. Corresponding

with this event was the return of a squadron of native cavalry and a company of native infantry, which had been detached in the previous month to the northern part of the districts for the purpose of dispersing a body of Arabs, who had assembled in some force about the Toombuddra with a view to plunder. Two or three deaths from cholera occurred in these detachments while on this duty, and two or three cases of it took place among them immediately after their return to the station; but the disease afterwards made no further progress in the native lines, while it spread extensively and committed great ravages among the native population in the pettah and bazar, causing, during the first fortnight, a mortality of from ten to twelve daily. It was in a great degree confined to the lower and more destitute class, few of the more opulent being attacked.

This epidemic did not extend to the troops within the fort until the 17th of the month, at which period it was greatly on the decline in the pettah and bazar. On this day a fatal case occurred in the regiment; the man was a very strong robust soldier, and had been labouring under severe vomiting and purging for some hours before he was brought into hospital. On admission the features were already livid and collapsed; pulse at the wrist nearly arrested; but the spasms were of extraordinary severity, and affected almost every muscle in the body, bending the spine into an arch. He died in six hours after admission. On being examined four hours after death, the gastrocnemii muscles, the flexors of the forearm, and several other muscles in both upper and lower extremities were found strongly contracted into firm rigid knots. From this period to the 2d of August six other decided cases were admitted, and what is remarkable, four of these were non-commissioned officers, three of whom fell victims to the pestilence. This is the extent of the ravages of the present epidemic in the regiment, and this limited visitation I am disposed to ascribe chiefly to the exertions of the commanding officer in confining the men to the barracks, and preventing as much as possible any intercourse with the pettah and bazar.

The weather from the latter part of June to the end of July was unusually cold, bleak, and damp for the season, owing to strong gales of wind from the westward, which blew more or less constantly throughout the period. The thermometer frequently fell as low as 74° at night, and never rose above 87° during the hottest part of the day; while the atmosphere was dense, hazy, and louring, threatening rain, but very little fell, although at this period of the year we generally experience a heavy fall. The month of August was more seasonable, and rain fell on thirteen days. In the course of the month the epidemic gradually disappeared, and from September to the beginning of February not a single case of it occurred at the station.

About the end of August or beginning of September cholera wholly disappeared from the station; it now, however, invaded the eastern parts of the districts; and advancing gradually and chiefly along the principal routes of communication, attacking in succession the different villages situated in its line, it reached Cuddapah in the middle of October, Kurnool in the beginning of November, and Ghooty in the beginning of December. It prevailed to no great extent at either of the two last stations, but at Cuddapah it committed considerable ravages, more especially in the 10th Native Infantry, then stationed there. This regiment on the 6th of December quitted that station for Hyderabad, but had only proceeded two days on its march when cholera again broke out in it; and the disease afterwards gradually spread to a considerable extent both among the sepoys and the camp followers, so that by the 18th, when the regiment crossed the Khistna river, upwards of ninety cases had occurred, of which twenty-four died. On that day the disease seemed all at once to have expended its force; for after having attacked twenty individuals almost simultaneously, it suddenly and wholly disappeared, and the corps afterwards pursued its route without the occurrence of a single case, and on the 2d of January entered the cantonment of Secunderabad, which, as well as the city of Hyderabad, was at that time free from the disease.

During the months of January and February, in consequence

of a general change of stations among the troops, there were seven or eight regiments on the move in different parts of the Ceded Districts, every one of which was severely visited by cholera. I shall not enter into a detail of its progress in these regiments further than is necessary to follow up continuously its route, and its retrograde march and return to this station in the beginning of February.

Among the regiments which were on the move, and which suffered from cholera at the period here alluded to, was the 3d Native Light Infantry, on route from Secunderabad to Bellary. This regiment quitted the former station in the beginning of January, and no sooner entered the Ceded Districts than cholera broke out in it to a very melancholy extent; and the disease still continuing in its train, on its arrival on the 29th of the month at a place called Peacock Hill, within seven miles of Bellary, it was here ordered to halt and to hold no communication with this station; but from the proximity of the encampment this was found impracticable, and on the very day of its arrival both men and camp followers were seen in every part of the cantonment, the bazar, and even the fort.

On the 3rd of February, four days after, cholera reappeared in the Cowle bazar, and soon spread, but by no means to the extent of its former visitation. It was confined to this locality for several days; but about the middle of the month some cases of it occurred in the Pettah, and in different parts of the cantonments; and at length, on the 27th, it broke out with concentrated force in Her Majesty's 4th Regiment stationed within the fort.

Whether the return of cholera among us can be fairly and legitimately ascribed to this intercourse with an infected corps is perhaps difficult, if not impossible, to determine; but I believe I am perfectly correct in stating, that from the beginning of September until after the arrival of this regiment at Peacock Hill at the end of January, not a single case of it occurred at the station; and, moreover, two of the followers of this regiment were actually the first who afterwards fell victims to it when it broke in the Cowle bazar.

Having followed the pestilence in its retrograde march back to the station, I shall now proceed to detail its progress and the extent of its ravages in the regiment.

The weather from the commencement to the middle of February was dry and clear, and moderately cool; the thermometer ranged between 72° and 88°; the wind was variable, but prevailed chiefly from the south-east; and there were no visible electrical phenomena. On the 6th a case of malignant cholera occurred in the regiment, and proved fatal in a few hours. On the 13th three mild cases were admitted, after which there was a suspension of attacks until the evening of the 26th, when a case of extreme malignancy was admitted, which terminated fatally in the short space of six hours. On this and the previous day the weather became suddenly warm and sultry; the thermometer rose to 90° in the shade; and from the cloudless state of the atmosphere the sun's influence was most powerful, to prevent exposure to which the men were restricted to their barrack-rooms between the hours of 9 in the morning and 5 in the afternoon. On the 27th the thermometer indicated a rise of two degrees in the temperature; the day was calm and clear, the afternoon rather sultry and oppressive. Cholera, which had hitherto confined itself to a few isolated attacks, now broke out at once to a great extent, and manifested itself almost simultaneously in every company of the regiment, so that in the brief space of eight hours 12 decided cases of the disease were admitted, some having been seized on guard, others in the barrack-rooms, and others in the patchery. This sudden and extensive outbreak of the disease spread universal alarm through the regiment, and numbers were brought into hospital, many labouring under diarrhœa and depression; others under giddiness, anxiety, and anomalous sensations in their extremities; while others had been suddenly seized with syncope in their barrack-rooms. Fear, no doubt, was the chief agent in the production of these affections, from which the sufferers were speedily relieved by warm stimulants and a pretty strong opiate to procure sleep. From 3 in the afternoon till midnight there were in all

twenty-six admissions; but, as before stated, only twelve were decided cases of the disease, and of these two proved fatal. On the 28th the weather was fine and clear and rather sultry, but not oppressive; the thermometer ranged between 81° and 91°. The admissions on this day were four, and the deaths one.

March 1st, the state of the weather and the range of the thermometer precisely the same as on the preceding day. Nine cases were admitted, but they were mostly of a controllable character; only one casualty. 2nd. The weather sultry and oppressive, the thermometer ranging between 82° and 94°; seven admissions, but no casualty. 3rd. The weather less sultry; the thermometer ranged between 81° and 90°; one admission and one casualty. 4th. Weather close and sultry; the thermometer ranged between 92° and 94°; five admissions and two deaths; one of these latter was under treatment since the 28th of last month, and the other since the 1st instant. In both imperfect reaction took place, but they sank under cerebral congestion.

The epidemic was now evidently on the decline, for from the 5th to the 10th only two cases were admitted daily, but several of these were of the most intense form; and out of eleven admissions during the period, six terminated fatally. The weather during these six days was warm, close, and sultry; the thermometer ranged between 81° and 94°. On the 11th the same warm sultry weather continued; the thermometer ranged between 84° and 92°: there were five admissions on this day, but they were mild and controllable; no casualty. 12th and 13th. Weather still warm and sultry, thermometer ranging between 82° and 94°; four admissions, all of the most severe form, and three of them terminated fatally on the following day, on which there was but one admission. On the 15th the weather was less oppressive; the thermometer ranged between 79° and 91°; one admission, but no deaths. On the 16th a strong gale of wind set in from the north-west, accompanied by a clouded or hazy state of the atmosphere, which, during the next two days,

educed the temperature so that the thermometer fell fully ten legrees, and the change appeared to have a manifest influenee n arresting the further progress of the epidemie, as there were fterwards no admissions until the 19th, when a ease of deep ntensity was admitted and proved rapidly fatal, after whieh here was a suspension of attacks until the 28th, when another and equally severe ease was admitted, and ran a rapidly fatal ourse. This terminated the visitation of the epidemie.

Table shewing the admissions and deaths among all classes, officers, men, women, and children.

	Strength.	Admitted.	Died.	Ratio of admissions to strength per cent.	Ratio of deaths to strength per eent.
Officers	21	1	0	4.76	0.0
Men	542	67	21	12.54	3.87
Women	49	9	3	18.36	6.1
Children	79	9	3	11.4	3.8

If to the foregoing table be added the thirteen eases of eholera that oeeurred in April and July, the following will shew the ratio per cent. of attacks and deaths in the right wing of H. M.'s 4th Regiment during the year.

	Strength.	Admitted.	Died.	Ratio of admissions to strength per eent.	Ratio of deaths to strength per eent.
Officers	21	1	0	4.76	0.0
Men	546	80	26	14.65	4.76
Women	48	12	5	25.0	10.4
Children	65	10	4	15.4	6.2

It will be seen by the preceding table of admissions that the women and ehildren have been attacked in a mueh greater proportion than the men, but that the ratio of the mortality has been strikingly alike in all elasses.

The pathology of cholera is involved in impenetrable obscurity, and I regret that with all the experience I have recently had in this inserutable disease, I ean offer nothing which is likely to throw any light on the subjeet.

Dissection gives us no insight whatever into its nature, for the only uniform and constant morbid states which it has hitherto presented have been congestion, more or less extensive, in the brain, and a deteriorated condition of the blood,—in fact mere secondary effects. With this exception the post-mortem appearances have not in any two instances been alike; for while the same organs have in one case been found extensively congested, they have in a second presented no abnormal appearances; while in a third they have perhaps exhibited some old standing lesions wholly unconnected with the disease.

There is one pathological state, however, which I cannot omit to notice, as it was present to a greater or less extent in almost all the cases that were examined; and that was, the collapsed state of the respiratory organs, which in several instances was so strikingly marked that those organs appeared, not only to myself but to others, to be reduced to nearly one-half of their ordinary volume. In this condition they were found lying close upon the upper part of the spine, and they presented little or no alteration from their normal appearance and colour, except that of being somewhat more compact in structure, and in a few instances slightly congested at their roots. In no instance did I witness that complete engorgement of those organs with venous blood which Mr. Annesly and others state that they invariably present after death from cholera. In some of the subjects in whom this collapsed condition of the lungs was so strikingly marked, the disease had pursued a rapidly fatal course, while others died after imperfect reaction had taken place; but in all the respiration was found to be considerably affected from the commencement, and I always remarked that whenever the breathing was thus early affected, the disease uniformly terminated fatally, although the pulse frequently maintained its firmness, and the temperature continued undiminished for many hours. To what cause to attribute this condition of the respiratory organs, or what connection, if any, it may have with the disease, are questions which I am unable to answer.

Rationale of treatment.—Generally on admission a full dose

of calomel combined with two grains of opium was given, followed by a draught of ammonia, æther, tincture of cloves and forty mimins of laudanum in a little camphor mixture, or spirits and water, and if rejected, both bolus and draught were repeated. When the stomach became tranquil, the calomel was prescribed in small doses combined with capsicum every three hours, and the stimulating draught continued as circumstances indicated. In a few instances mustard emetics were prescribed, but I cannot say that I witnessed any beneficial effects from their operation. When the depression was great, the usual diffusible stimuli, such as ammonia, æther, brandy, or port wine, were had recourse to; but a decided preference was given to ammonia, and I think it possesses this advantage over the other stimuli, that it can always be repeated at short intervals and in increasing doses according to the degree of sensibility remaining in the stomach. I have therefore prescribed it in doses of from ten to fifteen grains mixed with a little brandy and water, every ten or fifteen minutes in cases of extreme collapse, and in several instances with decided effect. Saline effervescing draughts and soda water mixed with a little brandy and from forty to sixty mimins of tinctura opii, were in some instances substituted for the ammonia and æther, for the purpose of allaying the vomiting; and soda water, which was supplied with great liberality from the officers' mess, was always best relished as drink to allay the intolerable thirst. Bleeding was strongly contra-indicated in every case, and was consequently never resorted to, except for the purpose of relieving cerebal congestion after reaction had taken place. Subsidiary to the internal treatment were the application of sinapisms to the epigastrium, spine, and extremities, and hot epithems and frictions of turpentine. Vesication of the abdomen and spine by the liquor lyttæ and the nitric acid was also frequently resorted to, and in some instances with apparently good effect. Hot sand bags to the feet were never omitted, and hot saline enemeta with assafætida, and occasionally opium, were also frequently tried, but without apparent benefit; certainly not

such as to compensate for the extreme inconvenience attending their frequent administration.

In three of the cases which came under treatment in the month of July, galvanism was had recourse to in conjunction with other remedies; and in the first case in which it was tried, it appeared to have a wonderful effect in rousing the sinking energies of the frame. The patient had already advanced to the blue collapsed stage, with arrest of the circulation; yet after a continued application of the remedy for about twenty minutes, the pulse became quite distinct at the wrist, and the lividity of the face and limbs in a great degree disappeared. This favourable change, however, was but of short duration, for in the course of the next two hours the pulse at the wrist again became indistinct, and the collapse equally profound. In this unfavourable state the remedy was again resorted to, and after a sedulous application of it for nearly half an hour, I had the satisfaction of finding the circulation a second time, and now permanently restored, and the patient ultimately, though slowly, recovered. In the two other cases its application was unsuccessful, and they both pursued a rapidly fatal course; one having died in six, and the other in ten hours after admission; but notwithstanding its failure in these two instances, I consider it a remedy well worthy of further trial.

At an advanced period of the epidemic in March the diacetate of lead was prescribed in four cases, chiefly among the women, in a much larger dose than is recommended by Dr. Graves. A bolus, containing four grains of the salt, two of capsicum, and one of opium, was prescribed every hour, and a solution of two scruples or a dram of the same in six ounces of water was administered by injection, and repeated after every liquid evacuation. The medicine was continued regularly until the intestinal discharges were arrested, which they generally were in the course of six or eight hours, and then small doses of calomel were substituted. All the cases in which this remedy was had recourse to in such large doses were of the most severe and intense character, but every one of them, however, rapidly

recovered, and not the slightest ill effect followed the exhibition of the medicine in such quantities. The result of these cases certainly impressed me with a most favourable opinion of the remedy, but I had, however, a few days ago an opportunity of again testing its effects on two patients who were suddenly seized with cholera in its most aggravated form in the regimental hospital, and in both, I am sorry to say, it signally failed; thus shewing, that a remedy which seems at one time to exercise a powerful control over the disorder, at another is found perfectly inert, and we have still to look forward to future research or to future accident for a specific remedy against this protean disease.

Having, I find, in the preceding details of the progress of cholera, afforded some grounds for supposing that I view it as a contagious disease, I beg to state that I certainly regard the efficient cause of this pestilence, whatever it be, in the light of a material poison, capable under certain circumstances of being propagated by bodies of men to others, who may be susceptible of its impression; and it appears to me that this opinion receives strong support from the slow and gradual, but general diffusion of the malady throughout these extensive districts during the past year. I must not, however, omit to mention that the hospital servants and others in constant attendance on the cholera patients during its recent visitation in the regiment were in no instance attacked. This immunity enjoyed by them, however, does not appear to me materially to affect the question, for fortunately Providence for the preservation of the human race has set limits to the ravages of this as of every other pestilence, so that only a certain number of individuals become susceptible of its influence, and this susceptibility does not appear to depend on any particular known habit of body, as the strong and the weak are equally subject to its attack. The most, therefore, we are fairly entitled to infer from this occasional exemption of the medical officers and hospital servants is, that their constant attendance and watching on cholera patients does not appear to increase their susceptibility to be attacked by it.

CHAPTER XI.

Report on Cholera in the 41st Regiment of N. I. at Madras in the Year 1841, by Dr. Lorimer.

Cholera and measles have prevailed in an epidemic form in Vepery and the neighbourhood during a considerable part of the last half year. The former appeared in the lines of the regiment amongst both men and followers in the month of October, but happily to a limited extent, though the disease shewed itself in the deadly low form; only ten men were attacked, of which number four died. The latter disease (rubeola), though it has existed more or less in the Vepery district since September, yet did not appear in the lines of the regiment till within the last three weeks. The cases have been fifteen in number up to this date, and its character, except in two cases, has been mild and tractable; in these two diarrhœa approaching to dysentery supervened, but was readily checked by ipecacuan and blue pill with opium, and astringents afterwards.

With regard to the treatment adopted in the cases of cholera, I have few remarks to make in addition to those given in an account of this disease in the first half yearly report for 1838, 24th Regiment N. I.,* and in the second half yearly report for 1839, 19th Regiment N. I. My experience on this present occasion has been happily limited, but I have been inclined to place more confidence in quinine in large doses, when the

* Page 32.

disease has presented itself within the fourth hour after seizure, than any other medicine; it is given, however, it will be observed, along with calomel and opium. In my opinion it exerts a certain degree of power or control in counteracting the course and effects of the depressing poison of cholera on the nervous system; it is only, however, in the first period of the disease that it can exert this influence, and it must be given largely and freely.

Several of the cases amongst the sepoys and also amongst the followers, and in the district, exhibited its beneficial effects in this respect; the experience, however, in this epidemic was too limited to enable me to recommend this remedy with that degree of confidence I should wish.

The means which were taken to prevent the spreading of this epidemic amongst the men will be seen on reference to the annexed extract from a letter addressed to the officer commanding the regiment, dated 8th October, 1841.

" 1st. The principal or main drains, being obstructed, should be opened. There is a fall of several feet from the southern past of the lines to the Cooum river, about 400 yards distant, and a drain might be opened in a direct line to it; without this the lines will be, ere long, as formerly under water; and indeed even now a considerable quantity is lodged around every sepoy's hut.

" 2nd. The low ground adjoining the light company lines, which emits offensive effluvia, should have a covering of one foot of sand or earth, and the tank near the hospital should be filled up.

" 3rd. The burial-ground opposite the former tank being also very offensive should have a coating of sand or earth in the same way and of the same depth. The ground at present is partly under water, and emits very sickening effluvia. The bodies of the people buried here are not more than a foot and a half or two feet below the surface; and, from these two powerful predisposing causes to disease, the sepoys in the lines in their immediate vicinity have been observed always to suffer in a

greater proportion from epidemic cholera and fever than the sepoys in the other lines. The first and second of these measures formed part of the general improvements alluded to, and as these along with the third (if the latter can be interfered with) could be readily and easily accomplished, they are proposed as a means of alleviating the attacks of this serious disease, and of checking its course amongst us at this time." [The drains have since been opened in a very efficient manner, and the tank near the hospital has been filled up; the interment of people in this burial-ground has been ordered to be discontinued.]

"I have not alluded to the faulty construction of the huts, because it is impossible to alter them just now. The floor is not raised in any of them, and in many it is even below the surrounding surface, nor have I alluded to the several tanks of foul stagnant water in the neighbourhood of the lines; but the adoption of the measures proposed I feel confident will be beneficial.

"I may be allowed to conclude by inserting a paragraph of one of my reports to the medical board on this subject:—

"'It is quite true that a great part of the native population do live and enjoy good health in worse situations, and in huts inferior in construction and comfort to those in the Vepery lines during the hot season, when the atmosphere is pure and free from morbific miasm; but it is also equally true that during the monsoon season the predisposing causes of febrile disease existing in and round these lines must favour in a greater or less degree the action on the system of any epidemic poison, and increase the number of its victims.'"

"The following table of acute diseases shewn in the returns of the regiments stationed at Vepery in 1837, 1838, and 1839, will corroborate the truth of this statement."

	1837.		1838.		1839.	
	Admitted.		Admitted.		Admitted.	
	1st Half-year.	2nd Half-year.	1st Half-year.	2nd Half-year.	1st Half-year.	2nd Half-year.
Fever	45	201	80	77	42	46
Dysentery	10	11	1	12	1	1
Diarrhœa............	7	13	26	14	1	3
Cholera	2	25	1	26	3	6
Total	64	250	108	129	47	56
Died	5	10	2	17	5	7

Besides the measures therein recommended, every sepoy was ordered to keep that part of the small drain in front of his hut open and clear, and his hut as clean as possible. Morning and evening I visited every part of the lines to see this was done, which had also the good effect of inspiring confidence in the men. Numbers flocked around me in these visits, appearing very happy that they were thus attended to and looked after; and I have no doubt that the state of mind thus produced tended to ward off many attacks of this scourge.

Former experience on three several occasions at Vepery and Perambore pointed this out as a preventive against this malady.

CHAPTER XII.

REPORT ON CHOLERA, AS IT PREVAILED IN THE 27TH REGIMENT N. I. ON ITS MARCH FROM BANGALORE TO SAMULCOTTAH IN 1838, BY JAMES INNES, ESQ. ASSISTANT SURGEON.

THE 27th Regiment commenced its march from Bangalore to Samulcottah on the 4th January, when the weather was delightfully cool, and the men in good health and spirits. During the ten days occupied in marching through the Mysore country the health of the regiment was remarkable; the average in hospital was six, and of these the cases were of a very trifling description.

On the 14th January we descended the Mogul Ghaut, and were immediately sensible of a great change in the temperature. The men having been upwards of three years and a half in the Mysore country, of course felt this alteration; but there was no apparent change in their health until we reached Chittoor.

We arrived at Chittoor on the 16th January, and halted on the 17th at that place. During the forenoon of the 17th I was asked for some medicine for the child of an officer's servant, who, it was stated, had been purged several times. During the afternoon a sepoy was brought to hospital complaining of having been purged several times. I was much struck with the appearance of this man. His eyes were sunk and hollow; his voice weak; pulse small and feeble; and he appeared much exhausted. While I was examining him, he was purged; the evacuation was watery, but of a yellow colour, without any

fæculence in it. I thought that this was diarrhœa produced by acrid ingesta and vitiated secretions. During the afternoon and evening he continued to be purged several times; the evacuations were all of the same appearance as first noted, viz. watery but coloured. During the night another man was brought into hospital complaining of purging and vomiting. This man's appearance was also most remarkable, and on examining the evacuations I was immediately convinced that it was cholera. The next day further confirmation of this opinion was found by the occurrence of six additional cases.

The ground on which we were encamped at Chittoor was high, clear, and well situated, at a considerable distance from the village, but not so far as to prevent communication. The civil authorities informed us that there was no cholera or other malignant disease in the district, and that there had been none for the last three months; but antecedent to that period the disease had raged with a fearful mortality throughout the greater part of the whole district, more particularly through the line of road on which our march lay. At the time we were at Chittoor, there was not a single case amongst the villages and surrounding inhabitants. Every day, as we continued our march, the disease continued to increase in frequency, though the casualties were not then very numerous.

Thus were we marching through a country where there was not, and had not been for the previous three months, a single case of cholera amongst the inhabitants, and yet we were suffering in a very severe manner from that disease. What was the cause of the exemption of the inhabitants from the attacks of the disease, while we suffered so much, would be difficult to say. We know that habit is a second nature, and that the human frame, from being constantly or frequently exposed to the noxious cause of disease, becomes at last deadened, if not altogether callous, to its effects. We know that, by training, one person may be brought to swallow poison in quantity that must inevitably prove fatal to another not so trained. We know that the cow-pox is almost a certain safeguard against

the small-pox; but whether nature establishes any invisible safeguard against cholera, by which, as in this instance, the inhabitants of a whole district exist in perfect safety amidst the source of the disease, be it miasm, malaria, or whatever else, some protecting influence there must be, for no sooner does a body of men from a distance, and who consequently could not have received this protection, become exposed to the source of the disease than they are attacked with much severity.

Symptoms.—The attack, as generally remarked of the disease in India, usually occurred soon after midnight towards morning. The men, though attacked thus early, seldom made the circumstance known till nearly daylight, when the regiment was about to commence its march, and on this account the symptoms were usually far advanced. The patient was carried to the hospital tents, his features sunk, eyes hollow, voice almost gone, skin cold and clammy, shrunk and corrugated on the hands and feet, blueness of the nails; the nails were also observed to be bent, as they are in the last stages of phthisis pulmonalis; pulse small and feeble. Spasms were an unusual symptom. It seldom occurred that any thing like premonitory symptoms existed. The attack appeared to be sudden and all at once, without any previous feelings of indisposition. I may relate the following case to show this. A young lad who had died in hospital from the epidemic disease had been attended by his brother during his illness. The body was carried to the grave on a country cot; one corner of the cot was carried by the brother; when near the grave, the brother fell down and had a large watery evacuation. The cot which carried the body to the grave, brought back the brother to the hospital cold and almost pulseless. This man to appearance had before been in perfect health. On being questioned, it was usually found that a patient had vomited once or twice and been purged two or three times, seldom more frequently. The evacuations were reported to have been fluid and of large quantity; an almost universal complaint was that the patient's ears were

closed, and no urine passed since the commencement of illness. When the discharges from the bowels were examined, they were found to be sometimes of a clear fluid with albuminous flakes floating in it, and sometimes of a milky homogeneous fluid like fresh-boiled congee water. In the first case that occurred at Chittoor the evacuations were coloured, but I did not observe this in any of the subsequent cases. In some in the very last stage (and all these proved fatal) *the discharges appeared to be mixed with blood, being of a reddish chocolate colour.* The blood was not distinct by itself or in clots, but mixed with a mass like the milky fluid above mentioned. It would seem that to such an extent had exhaustion and collapse gone, that the vessels of the mucous lining of the primæ viæ were unable to retain their contents, and that these had consequently been allowed to escape and mix with the other matters in the bowels. These evacuations generally came from the patient involuntarily and without his being aware of the circumstance. The spasms, or rather the cramps (which were by no means a frequent symptom), were not of a violent description; they were most frequently confined to the inferior extremities, shifting from the leg to the thigh and from one extremity to the other. Frictions, though perhaps they had no tendency to remove the source of the disease, gave much relief; the patients always called out to have themselves rubbed or shampooed. The mere mechanical action of rubbing long continued tends much to allay nervous irritation and overcome spasm. Whatever be the cause of the spasms, whether the presence of vitiated and highly irritating matters in the primæ viæ, or their being a symptom among others of the influence of the poison on the nervous system generally, in our present ignorance of the nature of the disease it would be difficult to say. However, there is no question, in my opinion, as to the efficacy of frictions in giving relief to this distressing symptom. The pulse was sometimes distinct and of moderate strength, and the skin of an almost natural temperature, but these were most unusual on admission. The first evacuations, which were very large, appeared to have

destroyed almost every vital energy. The all-absorbing indication was to rouse the patient from the state of collapse he was in. Every secretion was at a stand; the nervous influence, if not destroyed, was much disordered; the circulation had almost ceased; such was the state of collapse of the patient that to rouse him from it stimulants were indicated and given. Sometimes the patient complained of pain in the epigastrium and twisting pain in the intestines. Restlessness was always excessive, with much jactitation; sometimes the patients would squeeze themselves out into the open air from under the walls of the tent, and tumble and roll about on the ground. They could give no reason for doing so, and it certainly appeared prejudicial to them.

I have observed that motion of any kind, particularly if conjoined with exposure to the open air, has always been injurious. On looking at the patients before the march of the regiment in the morning, I have observed some with decided symptoms of amendment, the pulse better and more distinct, skin no longer covered with a clammy cold exudation; but when seen again on the line of march, the pulse had ceased to beat, and the skin had again become cold. Many such cases were brought into camp dead in the doolies. This has been the result of my observations, which I think it right to mention, as it is in direct opposition to what others state as being the result of their experience. A case in point may be mentioned; it occurred in a native officer, the jemadar of the grenadiers. At the time the regiment marched in the morning, his skin was more natural, not covered with the previous clammy exudation, and there was some return of warmth; his pulse had also slightly improved. I mentioned these favourable circumstances on the line of march in reply to the many anxious inquiries made regarding the jemadar; my mortification and disappointment were consequently great when, on the dooley reaching our new ground, I found the poor fellow dead. So fully convinced was I of the deleterious effects of the morning air, that I recommended to the commanding officer, who kindly met my views, that the regi-

ment should not commence its march in the morning until after the sun was well up. It might be asked, as movement was found to be attended with such melancholy results, why the regiment was not halted. The reason is evident; we were in a country fully impregnated with the epidemic constitution, and to halt in such a situation was willingly to offer ourselves victims to the disease.

We hurried through the valley which extends from Chittoor almost to Nellore, and at this last place took up an airy piece of ground for our camp, till that scourge which had so severely afflicted us for the previous sixteen days should leave us. Our halt at Nellore extended from the 3d to the 7th February. The ground on which we were encamped was a good distance from the town; it gradually rose through the whole extent of the camp to a considerable height, when the ascent abruptly terminated, and formed a declivity at rather an acute angle, sloping down into a large tank at that time full of water. Up the rising ground on which the camp was situated a most agreeable and pretty constant sea-breeze blew, carrying along with it into the tank situated below all the effluvia and contagious matter that might have been generated by the sick in our camp.

As a precautionary measure, the commanding officer was kind enough to listen to my suggestion to have the families, in which the disease existed, removed to a distance from the camp, and to forbid any communication taking place between them and the rest of the families. I also tried to induce several servants from the village to act as hospital assistants, so as to exclude altogether from the hospital tents the friends and relations of the men sick from cholera. This I also considered a precautionary measure of much consequence. These servants came to my tent, but though I offered them very high wages, I could not induce them to remain.

During our halt at Nellore the disease gradually became of less frequent occurrence, till it was considered we were again in a fit state to continue our march. On our leaving Nellore, such of the cases as were recent were left behind. The movement of

the men from our camp to the tent prepared for them at Nellore was attended with the worst results. Some of them who had recovered so far from the stage of collapse as to be able to walk out of the hospital tent, and ask me to take them along with the regiment, as they did not like to be left behind, rapidly sank after their movement. During a few days after we left Nellore we had a few cases, but these were of a more tractable nature; and on reaching the sea-coast the disease left us entirely.

After the patient had passed through the stage of collapse, he was sometimes attacked by almost as fatal a disease; in the epidemic which raged in Britain and Russia this disease was present, and was called the *consecutive fever.*

Dr. Keir, of Moscow, states that the cholera in this, its second period, assumes four forms:—" *the first,* an inflammatory, or rather dull inflammatory state of the stomach and bowels, more frequently the latter; somtimes both conjoined;—*the second,* inflammatory irritation of the lungs, with pain of the chest, cough, viscid expectoration and fever, appearing as a critical metastasis of the disease;—*the third,* bilious or bilio-nervous fever, with suppuration of the parotid glands;—*the fourth,* a congestive inflammatory state of the brain and spinal chord." I shall here insert Dr. Keir's description of this last form of the disease, for it could not have been more perfectly in accordance with what I saw if he had written his account of it from the instances that really occurred in my hospital: one symptom, however, was absent. " The last, as was natural to expect from the nature and seat of the affection, proved by far the most dangerous and most frequently fatal form of the second period. It appeared generally to supervene after the purging, vomiting, and cramps had been relieved, and the external heat in some degree restored. The patient complained of pain in the back between the shoulder blades, or in some other part of the spine, sometimes along its whole tract: he appeared sleepy to such a degree that I was at first disposed to attribute this state in part at least to the effects of the opium given in the first

period. But I was soon convinced that the cause of this symptom, and of another strongly characteristic of this form of the disease, namely, the filling of the vessels of the sclerotic with red blood, was a congestive subinflammatory state of the brain and spinal chord. This striking symptom at first began to show itself in the inferior part of the globe of the eye; it gradually increased, and little by little reached the upper part, while the eyes, turned upwards, exposed the lower part gorged with blood. This state of the patient generally ended in a complete coma, and proved fatal a few hours afterwards." The exemption of my patients from one of the symptoms mentioned by Dr. Keir I have remarked; the symptom to which I allude was the presence of "pain in the back between the shoulder blades, or in some other part of the spine, sometimes along its whole tract." The number of men who suffered from this form of consecutive fever was eleven, and not one out of the number made the least complaint of pain, or in fact of any symptom that would lead me to imagine that their convalescence was not progressing favourably.

This form of consecutive fever occurred in the first case of cholera which was admitted into hospital at Chittoor. For several days after the stage of collapse had left him, I considered him improving slowly. Two days before his death, during my frequent visits to the hospital tents, I remarked that he slept very profoundly. I was disposed to attribute this state to the effects of the opium given in the first period. I roused him up and inquired how he was; he replied that he was well, and gradually gaining strength. Not being satisfied with his continued somnolency, I made some further inquiries of him. I now found that his answers were not given so quickly as before, and that to make him understand what I said, it was necessary to repeat the question more than once and in a louder tone. If I ceased speaking to him for a short time, he appeared to fall asleep again; his answers, however, were always perfectly coherent and to the point. I also observed that his eyes were turned upwards, and that the vessels of the sclerotic were filled

with red blood; the eyelids during his sleep remaining apart freely exposed the eyes to view. This was the first case of this form of the disease which I had met with, and it will be seen how insidious it was in its commencement and progress. The disease had advanced to the stage just now described before I was fully satisfied that there was any thing more than usual the matter with the patient. Blisters were immediately applied to the head and to the nape of the neck, but the somnolency continued to increase till it terminated in coma, and ultimately in death. The second instance of this termination of the disease was in a fine man of the grenadiers. He had got over a very severe state of collapse during the first period of the disease; the attack was equally insidious in this instance as it was in the first. When the existence of the disease was ascertained, large blisters were applied to the head and neck; they appeared at first to do much good, but ultimately it terminated in coma and death. Warned by these sad examples of the fatality of this form of disease, my inquiries amongst the convalescent patients were minute and searching. On my detecting any thing like this congestive subinflammatory state of the brain and spinal chord, I immediately applied leeches or blisters, and sometimes both. Notwithstanding the watchfulness and promptitude in the application of the remedies indicated, out of the eleven cases six proved fatal.

I may mention the case of a havildar (now a native officer), Narrainsing, as there was a symptom present in his case which I do not remember to have seen noticed before in this disease. This was one of the worst cases that recovered. He was brought up from Tripetty late in the day in one of the doolies sent back for him. On arrival he was found without a pulse, skin cold and clammy, and to all appearance he was almost moribund; his stools were passing from him in small quantity. He was roused by the treatment and recovered. During convalescence he complained of a pain in the left leg and thigh, and on examination the vena saphena major was found hard like a cord. It could be traced almost throughout its whole extent from the back of

the foot to where it entered the femoral vein; but in particular as it neared the crural arch, it became thicker and very hard. I observed exactly the same appearance in another case. This symptom I think arises from the total cessation of the circulation; the blood in its then thickened state remaining so long stationary in this large vein, at last coagulates. The vein is no longer included in the circulation; it is quite impermeable, being completely filled by the mass of coagulated blood. The presence of this coagulated blood in the vein produced inflammation of its lining membrane; hence the tenderness of which the patients complained.

Case 1. *Permaul Rajoo, Sepoy.*—Admitted 8th February, 1838, by transfer from the hospital of 27th Regiment N. I. with several other patients, all of whom had been affected with cholera. On his admission into hospital he complained of severe pain the whole length of the right thigh and leg; pulse quick and full; tongue glazed, of a bright red colour; bowels very irritable, evacuations natural; the foot and leg nearly as high as the calf have dried; the lower part of calf in a mortified state; no appearance of separation; the leg above the mortified part neither inflamed nor swollen, but below the natural temperature; stimulating fomentations and liniments applied to the leg, and a poultice.

9th. Appears better; tongue less glazed; pulse softer and more tranquil; pain less; mortification extended upwards on the outer side of leg; slept now and then during the night.

10th. Tongue still glazed and red; bowels frequently open; pulse quick and full.

11th. Slept pretty well; tongue less red and more moist; two or three watery evacuations; pulse the same; the mortification extended in front; no inflammation or swelling above the mortification, but much pain is felt in the popliteal space.

12th. Has been very drowsy; pulse now 84, but tongue still evidences much irritation; three watery evacuations; knee and upper part of leg feels cold; urine copious.

13th. The upper part of leg appears tense to-day, but no inflammation appears; free incisions made all round in a perpendicular direction, through apparently sound and unsound parts; a copious dark bloody discharge came away; pulse 96, full; tongue red and glazed. The incisions gape wide open; no appearance of inflammatory action.

17th. Died last night, and permission was given to dilate the wounds of the leg. External appearance of thigh presented nothing remarkable. On laying it open in the course of the bloodvessels their sheath was in a state of half

putridity; and the vastus internus muscle quite so. The os femoris was white and denuded of its periosteum in all its extent, except at the knee, at which part it appeared natural. In many places the periosteum was raised by air-bubbles. The ham was in a state of mortification. At the part where the bloodvessels pass through the extensors of the leg, that portion of the triceps was sphacelated, but the other part of the muscle had not yet put on that state. The biceps was healthy. On separating the bloodvessels, the upper portion of the femoral artery appeared enlarged, as also the vein. On cutting open the artery its internal surface was corrugated with transverse rugæ, giving the appearance of a bronchus cut in half. The internal coat of the vein presented a dull, thickened, and opaque surface; in the middle of the thigh the artery was obliterated with coagula.

The inspection was not carried beyond this, as a promise had been made that no disfiguration of the limb should take place.

The following additional cases of these affections were published at a subsequent period by T. Godfrey, Esq., Garrison Surgeon, Bellary :—

Case 1. *Sepoy Maunicum,* II Company, No. 1125, æt. 20. 24th September, 1843. Attacked with cholera of the low form, without cramps. Pulse for two days scarcely perceptible, after which the circulation continued very feeble for three days. On the 2nd October it became much stronger but slow, only 44 beats in the minute; the subsequent day he complained of pain along the inner side of the left arm. On examination the basilic vein was found distended and hard the entire way up into the axilla. Inflammation and extensive ulceration in the course of the vein ensued, which detained him in hospital for nearly one month, at which period (23rd October) the coats of the vessel appeared to be preternaturally thickened, but obliteration had not occurred.

Case 2. *Drummer John Mally,* F Company, No. 24, æt. 16. 6th October, 1843. Attacked with cholera and remained quite pulseless for thirty-six hours; reaction occurred on the 8th, but he remained weak. On the 11th complained of pain in the left thigh. On examination the saphena vein was found for several inches to be much distended and hard to its termination in the femoral. Inflammation continued, and a large long ulcer formed over the vessel (without much suppuration), for which he was kept in hospital till the 4th November (nearly a month); the vein on his discharge appeared to be thickened in its coats. In this case during its progress some of the superficial inguinal glands were slightly enlarged, but not painful.

This boy and the subject of the preceding case have been examined subsequent to their discharge from hospital; the veins and their surrounding tissue continued indurated, but obliteration of the vessels had not occurred.

Case 3. *Sepoy Savapathy*, G Company, No. 943, æt. 23. 5th October, 1843. Attacked with cholera of the low form, without spasms. Remained pulseless and corpse-like for thirty-five hours, and continued in a very feeble state, with merely a vibrating thrill at the wrist, till the 9th October, on the evening of which day he passed urine for the first time since the attack; improvement continued to be very gradual. On the 12th he complained of pain in the penis, which on inspection was found to be swollen, tense, and elastic. On the 14th mortification commenced, and continued the subsequent day. On the 16th he was carried over the Godavery, which occupied several hours from the swollen state of the river. On his arrival at the place of encampment at Rajahmundry I was suddenly called by the apothecary, who stated that the man had lost a large quantity of blood whilst crossing the river. I found him still lying in the dooly with his clothes saturated with blood, greatly exhausted, tremulous and with very faint pulse. The whole extremity of the penis had assumed a dark, humid, pulpy mass, highly offensive, and having a free transudation of florid blood from its surface as from a sponge. Moderate pressure and nitric acid were employed without any beneficial effect, the latter not gaining access to the vessel from whence the bleeding arose, and the swollen state of the parts did not admit of adequate pressure being used. There was no distinct line of separation; and as the loss of every additional ounce of blood appeared to be of vital importance to the patient, the dead mass was nearly all cut away by a scalpel, and the artery from whence the blood was jetting easily found, appearing to proceed from the centre of the right corpus cavernosum; it was ligatured, and all hæmorrhage instantly ceased. Nitric acid was then applied to the remaining gangrenous surface, which separated on the third day, exposing the wounded extremities of the corpora cavernosa quite clearly denuded, excepting that a very small portion of the glans remained on the upper part of the left cavernous body. The parts healed slowly but perfectly, and he was discharged from hospital on the 16th December, 1843; but as he appeared to suffer in general health and also from mental disquietude, he has since been sent on sick leave for a few months to his native village. I may mention that he was a married man and quite free from all venereal disease.

Prognosis.—From what has been already said, the prognosis in the disease from which we were suffering will appear sufficiently discouraging. It was found difficult, in many instances quite impossible, to say with anything like certainty whether the disease was to terminate favourably or otherwise; in general, however, the danger was indicated by the degree of collapse in the first stage, and the extent of the coma in the second. These symptoms, however, were occasionally fallacious. Cases have

occurred of a most hopeless nature, in which the pulse was gone, the skin cold and clammy, in fact death apparently at hand; they would remain stationary, surprising me each time I visited them that death had not carried them off. After continuing thus for a long time, after every hope of recovery had vanished, I have been astonished by a feeling of the existence of a pulse; this became gradually more and more developed, warmth by degrees returned to the skin, and contrary to every expectation and reasonable hope such cases have recovered. In the secondary disease, cases of much severity have also recovered; a young boy got well after being in a comatose state and almost insensible for three days. Shaik Jangeer, a sepoy, recovered from much the same state. These facts show that in even the worst form of this disease cases are not hopeless. The approach of recovery was denoted by the pulse rising, heat returning to the surface, vomiting and purging becoming less, or ceasing altogether, and a disposition to sleep being evinced. I did not observe that the presence of the cramps or spasms in the extremities indicated in the least the prognosis; nor could I trace any thing like a ratio between the degree of the stage of collapse in the first period, and the intensity of the secondary disease in the second. Out of the total of cases, 148, there were only 11 cases of the secondary disease called "consecutive fever;" whereas, if this disease depended upon or bore any proportion to the intensity of the collapse in the first period, the cases of secondary disease ought to have been more numerous.

Diagnosis.—In the first case of the disease that occurred at Chittoor the diagnosis was not clear. I was in doubt whether to look upon it as a purging produced by anything unwholesome which the patient had eaten, or by disordered and vitiated secretions from some of the abdominal viscera. The symptom which caused the doubt was the discharges from the bowels being colored with bile. The appearance of the patient, as I have said, struck me much; and the result of what passed in my mind was, that it was more likely, from the present symptoms, that the case was one of the sporadic rather than of the

epidemic cholera. The pathognomonic symptom of the epidemic form of the disease was absent; the stools were not like congee water (the true characteristic of that form), but contained a proportion of bile, a symptom which would at once place the case amongst those of the sporadic form. In order to render this case still more puzzling, the consecutive fever of the second period was developed in it. This symptom was considered in Britain the *experimentum crucis,* by which alone the essential alliance to the epidemic form could be proved. In the present instance the symptoms during the first period unequivocally placed the case in the sporadic form of the disease, and those of the second period by the above rule as decidedly made it appear a case of the epidemic form. In the subsequent cases there was not the least difficulty in the diagnosis. The symptoms already related as present in the cases which occurred in our camp, it is imagined were sufficient to mark this disease from any other.

Nature of the disease, or proximate cause.—In a vast majority of the cases the first symptom was a sudden call to stool; feelings of indisposition or premonitory symptoms of any kind were exceedingly unusual; and when this feeling was gratified, the evacuation was enormous, generally so great as to make the pulse sink and produce a coldness of the skin. Sometimes the purging was preceded by vomiting, though more frequently followed by it. From these being so universally the first symptoms, I was led to look upon the stomach and bowels as the parts primarily affected, and most likely the stomach the first. Thus far appeared clear and demonstrable; but whether the disease depended on an impression produced by a morbific cause on the stomach and alimentary canal, or on the nervous and vascular systems by electrical atmospheric change, is uncertain. The affection of the alimentary canal is essential and primary, if any part of the disease is so; but in what it consists or how produced, I know of nothing that would lead to a satisfactory conclusion. The above observations have reference to the *first period* of this disease, or stage of collapse.

The second period, characterized by the affection of the brain, appears susceptible of a most satisfactory explanation. Dr. Keir, of Moscow, states this affection to consist in "a congestive subinflammatory state of the brain and spinal chord;" and every symptom of the disease that I met with clearly proved the correctness of this view of its nature.

The opinion of the existence of a relation between cholera and fever appears to be gaining ground in the present day, and some of the facts alluded to in this report would seem corroborative of this idea. I have mentioned that out of the number of cases treated by me there were 11 in which consecutive fever occurred; all of these cases were characterised by congestion in the head. In the reports of the cholera which prevailed in Europe, consecutive fever is mentioned as a never failing attendant, and forms part of the definition of this disease by authors. My experience does not lead to such a sweeping conclusion. The stage of collapse cannot be looked upon as the cold stage in excess of a febrile paroxysm, as, were it so, the consecutive fever would never be absent; whereas, out of 148 cases, there were 11 only in which consecutive fever showed itself. Fever consists of a series of actions; when one action ceases, another commences, and so on till the disease terminates. But in cholera it is different; there is no passing from one stage to another, except in a few solitary instances, which surely cannot form the rule, but much rather the exception. When a case of cholera terminates favourably, the pulse again regains its strength; the skin its natural warmth; the secretions are restored; the patient convalesces in a few days, and gradually recovers his wonted strength and health. This was the usual course in the vast majority of cases which recovered under my treatment, and certainly a person would not say there was anything in all this to indicate the presence of fever.

When we consider the violence done to the most important organs of the body by this disease, that the circulation almost ceases, that the blood is left in a thickened morbid state, secretion totally at an end, and the most important organs gorged

with this thickened blood, why should we be surprised that any organ should suffer from subsequent disease? The wonder, I think, should be, that the patient ever escaped without suffering from some disease either of congestion or of inflammation. Such a disease occurring is, however, by the theoretical views at present in the ascendant, brought forward to prove the presence of fever.

The number of cases admitted with cholera was 148, and of these 67 proved fatal. This proportion is exceedingly high, and is only to be accounted for by the severity of the attack, and the many disadvantages under which the treatment was conducted on a line of march. Even in hospitals, with good wards, bedding, attendants, and every thing at command, in severe attacks of the disease the proportion of deaths has been high; but in a camp without any of these conveniences, and under circumstances many of which are absolutely injurious, it is natural to expect the proportion of deaths higher. The number of Hindoos attacked was much greater than of the Musselmans; and amongst the Hindoos the relative proportion of deaths was much higher than amongst the Musselmans. This may perhaps be accounted for by the usual mode of living of the former class of persons, and their generally weakly constitutions. Had the character of the disease been different, the proportion might have been nearer, or perhaps have been greater amongst the Musselmans. Had there been anything like inflammatory symptoms, I should have expected the Musselmans to have suffered proportionally more. It appears to me that the character of the disease has not been paid sufficient attention to by those who say, that from the varying statements of proportionate attacks and deaths among these two widely different classes of men, no satisfactory conclusion can be come to. In the disease from which we suffered, characterised by sudden and overwhelming collapse, we find the Hindoos suffer most; and in the consecutive disease of the second period, we find the Musselmans by far the most frequent objects of attack. Out of the 11 cases, seven were Musselmans.

Cause of the cholera.—I need not enquire what agent first generated the disease called cholera, but be satisfied if I attempt to show how in this instance it was produced, and from what cause it spread so rapidly and fearfully amongst the men.

Chittoor, the locality in which the disease first made its appearance in the regiment, had been visited by cholera some months before our arrival, but during the three months previous not a single case occurred there or on any part of our line of march.

At Vellore, only 18 miles distant, cholera prevailed, and I am aware of several persons having come into our camp from that place on the 17th January, on which day the cholera first appeared. The friends of a sepoy, who had got leave to go to Vellore to visit his relations, returned from thence with the intelligence of the death of this man from cholera. A staunch contagionist would call this a direct importation of the choleric contagion; although these people had not the disease themselves, they might have brought the seeds of it with them so as to infect their friends or those who had communication with them. Notwithstanding this may be thought by some a sufficient cause for the cholera, yet it appeared to me at the time that we were indebted more probably to the presence of the epidemic *constitution* at and near Chittoor for our visitation.

At Tripetty the disease had a short time before raged with the most fearful fatality, as we but too clearly saw by the immense number of graves around the village in all directions. The line of road from Chittoor to Tripetty lies in a valley between mountains of considerable height, covered with verdure and underwood. In the valley formed by these mountains runs a stream, which during the season of the rains is of great breadth, in some places extending from the foot of the mountains on one side to the foot of those on the opposite. At the time of our march, however, there was not much water in this river, but enough to make the stream run freely, and wet a man's leg about half-way up. This river wandered and twisted about from one side of the valley to the other in such a manner that sometimes on our morning's march we had to cross it

eight or ten times. The banks of the river were generally nothing but dry sand, though in some places there was considerable vegetation. I can scarcely conceive a locality better adapted for the generation of malaria, miasm, epidemic constitution, or by whatever other name theorists choose to call that invisible something producing disease.

Tripetty is a locality peculiarly known as the seat of this malaria or miasm, and the disease produced there appears to be of singular malignity. Through the valley I have above mentioned, a strong breeze almost constantly blew; and Tripetty being situated at the extremity of it, we were of course subject to the influence of this malaria brought down to and through our camp by this wind. Every circumstance shewed that a cause for the pestilence was conveyed to us on the wings of the wind, and as we neared Tripetty the disease continued stage by stage to become more universal and intractable.

We marched through the village of Tripetty on the morning of the 24th January, and pitched our camp about five miles beyond it. On passing through the village in the morning we found, out of the men who had gone as an advanced guard, and others on leave, lying in the village, some dead and some in the last stage of cholera. By much exertion some country cots were procured, and these cases were brought up to camp by coolies as well as we could.

It would be utterly impossible to picture the heart-rending scenes which took place during the after part of the day in this village of Tripetty; some idea may be formed of their nature when I state that no less than 82 casualties occurred amongst the followers on that day. The men appeared to look with horror on that village; so strong, indeed, was the feeling, that there were but few who would venture back to search for their relations, friends, or properties.

From what I have here said, it is apparent that I look upon malaria or miasm as the first cause of the attack of cholera from which we suffered. But although I consider malaria the primary cause of the disease, I am equally satisfied that it was

kept up in our camp by contagion; we know that many fevers which originate from miasmatic influence are capable of generating similar diseases by contagion.

The fact of our being attacked by the disease on coming from a part of the country where no cholera existed, to a district in which it had before raged, but where for three previous months there had not been a single case, clearly shows in my opinion the miasmatic origin of our attack. What other cause could have produced the disease? Contagion could not be present, as till our arrival at Chittoor the disease was not known to exist in the district; and we can hardly suppose that the people who arrived from Vellore, an infected place, on the 17th, could have communicated the disease so immediately to others. Although the period of incubation of contagion has never been ascertained in any disorders, there is no evidence to lead us to think it more rapid in cholera than in other diseases.

Before I saw so much of cholera as I did on our last march, I was of opinion that it was not contagious; I have, however, since seen much reason to induce me to change my mind. I was led to consider that the disease was capable of generating itself by contagion from the following reasons, which I shall test by Dr. Alison's very precise rules for discriminating the operation of contagion.

1. "Strong evidence of a disease being contagious is furnished by its appearance, in communities previously healthy, shortly after the arrival of persons from infected districts, who are themselves suffering from the disease."

This rule I do not look upon as applicable in our case. I consider that the disease in this instance arose from the epidemic constitution in the first place, but that it was afterwards kept up by contagion.

2. "The gradual diffusion of a disease through a limited community, those near the sick being first attacked, and others in succession in proportion to the proximity."

I would observe on this rule, that the disease, when it once attacked a family, generally went through it. Some of the men

lost five and six children; men with large families were sometimes left with one child, sometimes with none; while many of the other families were not attacked at all. But it is in the last rule that the operation of contagion can be most clearly traced.

3. "The comparative liability of the attendants on the sick to the disease."

I had full proof of this; many of the friends of the sick men who acted as their attendants in hospital were attacked by the disease. I have already mentioned the case of a sepoy who fell down from beneath his brother's corpse as it was about being borne to the grave. Another sepoy, who had cholera, was attended on by a relation and recovered; a few days afterwards this relation was brought to the hospital with cholera. The sepoy first attacked attended on his relation in turn; the relation recovered, and the sepoy attending had a second attack of cholera. To each company of the regiment there is attached a man called a writer, who under the European officer keeps the company accounts and records. Out of these eight men no less a number than four had the disease. I account for this by these men frequently coming to the hospital tents to see and converse with the men of their companies, and by it being part of their duty to count over and keep the property of the diseased men: thus they were compelled to handle their clothing, fully impregnated with fresh contagion. The washermen also suffered much out of proportion to their numbers; three of them had the disease, and in all it occurred when the disease was leaving the regiment. I believe the three last cases that I had were the three washermen. These men got the disease from handling the clothes of the men who had suffered previously, and by having their bodies frequently wetted by water impregnated with the dirt and contagion of these clothes.

These certainly are strong facts in proof of the contagious nature of the disease. Of those attached to the medical department of the regiment, the hospital havildar and the hospital conicopolly had cholera. From what I observed, it appears to me that it is only at particular periods of the disease, and under

peculiar circumstances, that it is contagious. The period at which contagion appears to me to arise is immediately before dissolution has taken place, *and after death.* Near or after death decomposition and relaxation take place; contagious matter escapes; and it is then that I believe its effects are most marked. It has been said that contagious matter is given out in great abundance, and of a very virulent nature, after the first period of collapse has passed, during the second period. I think I have observed from the numerous cases of attacks amongst those attending on the sick, that close personal contact long continued has produced the disease. Going through a ward as a medical officer does, handling the different patients so as to ascertain the state of their skin and pulse, I do not consider sufficient to communicate contagion; but the lying alongside a patient, breathing for a protracted period the same air, the two bodies coming in contact, and rubbing against one another, are circumstances, I think, fully capable of doing so. The natives have an idea that the last breath of a cholera patient is certain to produce the disease.

Treatment.—From what I have already said of the nature of the disease, some idea may be formed of my view of its treatment. To conduct this on scientific principles we must suit our remedial agents to the view entertained of the nature of a disease; and having already stated my scepticism in the belief of the prevailing theories of the day regarding the nature of cholera, I therefore pursued a treatment indicated by prevailing symptoms. I have said that the disease occasionally had two widely different periods or stages, and of course the treatment requisite for the symptoms of these different periods was widely varied.

I shall state my treatment of the first or choleric period of the disease in the first instance. By reference to my enumeration of the symptoms, it will be seen that the most prominent and all absorbing were those of excessive collapse and exhaustion. Under such circumstances the exhibition of any medicine, except those of a most powerfully rousing nature, appeared

useless. When the epidemic first broke out, the first medicine which I tried was calomel and opium; and I gave them in the proportion of calomel 1 scruple, opium 2 grains. These medicines appeared to relieve the irritability of the stomach, and to soothe the alimentary canal during their passage through it. When the stomach retained this medicine for some time, I gave stimulating draughts with a view of rousing the patient and restoring the circulation. These draughts were composed of the aromatic spirits of ammonia, spirits of lavender, oil of peppermint, and brandy. All these powerful stimuli were given in pretty large proportions. In many instances these remedies produced the desired effect, though in others they were unsuccessful. The calomel and opium were in some instances repeated, with the view of continuing their soothing effect on the primæ viæ, and of rousing into action the functions of the different organs and tissues, which at the time were entirely at an end. The stimulating draughts were given at intervals. If the irritability of the stomach continued notwithstanding the administration of the calomel and opium, I gave laudanum and brandy, with occasionally the best effects. This is a medicine which, amid all the changes in the theoretical views of the nature of cholera, has maintained its reputation, and I can bear evidence to its occasional powerful effects, particularly when given early in the disease. The stimulating draught above mentioned was varied in its composition according to the circumstances of the different cases, in proportion as the stimulating effect was solely required, or required in combination with the soothing effects of the tincture of opium. I have administered opium by enemata in the quantity of 2 or 3 grains with good effect. To relieve the pain in the stomach and bowels I applied frictions, sinapisms, and the liquor lyttæ: the good resulting from these remedies was not very apparent. I have mentioned before that frictions were applied for the relief of the spasms or cramps, and effectually; I also used frictions of the liquor ammoniæ and turpentine. Throughout the whole treatment artificial heat was constantly

applied to the body. Having heard much of the virtues of a remedy suggested and used by a gentleman at Salem, I made trial of it. The component parts of this mixture are:—1 teaspoonful of laudanum; 1 do. of spirits of lavender; 1 do. of essence of peppermint; 25 drops of ammonia; 1½ table-spoonful of brandy; 3 do. of castor oil. I used this medicine in very large quantities, and from its being conveniently carried and administered, I had it constantly at hand on the line of march. I distributed several bottles of it amongst some trust-worthy men of the regiment, whom I instructed in the manner of administering it. This was made known among the men and followers, and the medicine was thus always at hand for their use, and given immediately it was required. I think highly of the remedy from the good effects of it which I witnessed; and should another opportunity for testing its power ever occur to me, I shall not fail to make trial of it.

After the mixture has been given, it is absolutely necessary to keep water and fluids of all kinds from the patient. If he be allowed to remain quiet, and be prevented from drinking, the medicine usually remains on the stomach, soothing it and the primæ viæ as it passes along. If, however, fluids be indulged in, the stomach immediately throws off its contents. I may remark generally of the exhibition of fluids in this disease, that I think them highly prejudicial when taken in large quantities; but no person would be so cruel as to keep fluids altogether from cholera patients. It is the abuse, not the use of the practice I find fault with. A small quantity of fluid, enough to wet the lips and mouth, may be permitted frequently; but to permit the patient to fill his stomach, as he most undoubtedly will do if not restrained, would be to allow him to bring back the most distressing symptoms of the disease, viz. the vomiting and purging. The idea of fluids entering the blood and rendering it less thick appears to me unsupported by evidence, and I should think would have a directly opposite effect.

This is not merely a speculative view, for it was first suggested

to me by observations on several cases, and afterwards confirmed by many more. The thirst is a most distressing symptom, and with all my orders and warnings I found it in many instances quite impossible to keep water from the patients. Amongst such cases as these I saw the disastrous effects produced by indulging in free drinking. On the arrival of the doolies on new encamping ground I frequently found the patient's clothes and the dooley covered with rice and congee, with which his thoughtless friends had been supplying him on the line of march, and the patient himself much exhausted by this continued vomiting.

After having administered this mixture, therefore, I consider it peculiarly necessary to prevent the patients drinking. The good effects of this precaution being insisted upon were visible by the recovery of many officers' servants from this disease. One officer had three servants attacked by the disease, and they all recovered; not one of them was allowed to touch water for a long time after the administration of the medicine.

The mixture suggested by Major Wallace I also made trial of, but was not satisfied with the result.

From the peculiar character of the disease with which we were attacked, I consider it obvious that bloodletting was a remedy entirely out of the question. In cases of this disease of a different character bloodletting is a most valuable remedy. Of this I am well satisfied; but in the disease from which we were suffering, to have bled the patients would have been to increase the worst symptoms and hasten their end. Bloodletting was therefore not used.

I have entered thus minutely into the history of the attack of epidemic cholera from which the 27th Regiment suffered, for several reasons. It would be impossible, by a selection of any number of cases less than the whole, to convey all the observations made amongst the vast numbers which presented themselves, even if it had been possible to keep the cases with sufficient accuracy. I consider also that by forwarding such a detail of the disease to the Medical Board as the accompanying,

I put it in their power to offer suggestions as to the propriety of sending troops through tracts of country which have lately been the scene of the ravages of this dreadful scourge.

The Board, from their long period of service and experience, may also be enabled to draw comparisons between the character lately assumed by this disease and that which it possessed when it first appeared in the country in 1817, from which useful practical results may follow. And above all, firmly believing in the contagious nature of the disease under the circumstances met with by me, (for which belief I have offered strong reasons,) I put it in their power to afford instructions to executive medical officers, when placed in situations similarly to those in which I was lately placed, as to the necessity of preventing communication between the sick and the healthy.

Memorandum of the number of cases of Cholera and deaths, exhibiting the different castes attacked.

Total number of cases admitted	148
Number of deaths	67
Number of Musselmans admitted	64
Number of Hindoos admitted	82
Number of Pariahs admitted	1
Number of Indo-Britons admitted	1
Number of deaths in Musselmans	27
Number of deaths in Hindoos............	40

Constitution of the Regiment, with reference to caste.

	Native Officers.	Havil-dars.	Naigues.	Privates.	Total.
The number of Mussulmans of all classes in the 27th Regiment N. I..........	8	22	26	260	316
The number of Hindoos of all classes in the 27th Regiment N. I.	8	19	14	378	419

Memorandum shewing the number of cases and deaths from the consecutive disease of the second period, and the different castes attached.

Total number of cases	11
Total number of deaths	6
Number of Musselmans who had the disease	7
Number of Hindoos who had the disease ..	4
Number of deaths amongst Musselmans ..	4
Number of deaths amongst Hindoos	2

CHAPTER XIII.

Report on Cholera in the 31st Regiment of Native Infantry, at Trichinopoly, in the year 1842, by D. Trail, Esq.

Cholera has been more or less prevalent in Trichinopoly throughout the year, but first appeared in the lines of the 31st Regiment in the second week of November, shortly after the commencement of the damp chilly weather consequent on the setting in of the N. E. monsoon, and assumed a very fatal form; few of the cases amongst the followers, which we could get information of, recovered.

On the 11th of November the first case was admitted into hospital in a very low state, and the patient rapidly sank. Others speedily followed; and up to the 26th twelve were admitted, of whom only four recovered. Suddenly the disease without apparent cause assumed a milder form, and of the next 21 cases, to the 15th December, only five died. From this date (the day on which the detachments marched for the out stations) to the end of December eight more were admitted at head quarters, and of these five died, making a total treated at Trichinopoly of 41, of which 18 died.

The remaining 11 cases included in the return occurred amongst the detachments. Of these only two deaths are returnable, but a third was reported to regimental head-quarters from the detachment proceeding to Salem while on the march, and it is included amongst those dying without medical treatment. Another case is also included under this head: a young recruit who was assisting at a relation's funeral was purged on the way

to the burying ground, but on his return neglected to report himself, and about an hour and half afterwards he was discovered by the orderly havildar in a very low state, and died while being carried to hospital, having been ill about 2½ hours. Another case occurred in the detachment proceeding to Negapatam, of which no report was made; this man, however, recovered.

The total, then, of cases in the regiment amount to 55, of which 21 died with medical treatment and one without.

Of those treated at Trichinopoly, the proportion of deaths among the Hindoos and Musselmans affords a remarkable contrast. Of the former 18 cases were admitted, of which 10 proved fatal. Of the latter 21 were admitted, and only six died. The other two deaths from this disease were Indo-Britons, the only two admitted; one an old, dissipated, weakly man, who came to hospital in the last stage of the disease; the other a stout healthy young man, and a member of the temperance society for the last two years, and one of the best men in the regiment. He applied for medicine in good time, but shortly after he had six copious watery stools within an hour, from which he gradually sank.

Of 13 cases above the age of 35, ten died, and three recovered. Of these 5 were Musselmans, of whom 3 died and 2 recovered; 7 Hindoos, of whom 6 died and 1 recovered; 1 Indo-Briton, who died.

It thus appears that the mortality has been much greater among the Hindoos and the elderly, the better fed and generally more robust Musselmans and the younger men not succumbing so readily under the disease.

Symptoms.—The general character of the epidemic has been that of extreme collapse, in which state many were brought to hospital either from neglecting to report themselves sick in proper time, or from the great severity of the disease, and amongst these the greater proportion of deaths occurred.

Spasms were not generally complained of at the commencement of the attack; but after the skin became cold and the pulse thready, almost all complained of cramps of the legs, but these

were seldom severe. Burning at the pit of the stomach was not complained of in all cases, some being without this symptom from the commencement to the termination of the disease, either in death or recovery. The evacuations at the commencement of the disease were copious, the first perhaps a little yellow (but generally not observed by the patient); but the subsequent motions were watery and colourless, with shreds floating in them. In two of the milder cases a slight bilious tinge was observed. In the severe cases the stools followed each other in rapid succession, allowing no time for medicine to act, and reduced the patient to a hopeless state of collapse. Vomiting in some few cases did not occur at all, and in general was not a marked feature of the disease, provided fluids were refrained from; the stimulating draught generally given on admission frequently produced the first fit of vomiting. Copious clammy perspirations, cold skin and tongue, thready frequent pulse, feeble voice, and sunk countenance, were more or less present in all the cases, with a rare exception, as where the patient applied for medicine after the first evacuation and the disease being immediately arrested by the first or second dose. The same remark applies to the urinary secretion, which was always absent while the disease was fairly developed.

Prognosis.—With the above well-marked symptons, the diagnosis could not be difficult; but however favourable the state of the patient on admission might be, no prognosis could be ventured. Even in some of the apparently most hopeless cases, I have had the pleasure of finding my unfavourable prognosis incorrect; as the disease progresses, however, favourable or unfavourable symptoms develope themselves. The purging ceasing, though not of itself a favourable symptom, is, along with the signs of reaction, the most favourable of all; for so long as this continues, the patient is in imminent danger, and reaction seldom takes place until it is fairly arrested. In the fatal cases it generally stopped hours before death, but the patient gradually became lower and more oppressed until death occurred. The purging ceasing with usual symptoms of re-

action generally indicated recovery, and the urinary secretion re-appearing was observed to be a certain sign that the disease had been overcome, and the patient was considered safe if no secondary fever supervened. Copious stools in rapid succession, speedy collapse, the pulse becoming imperceptible at the wrist, the skin cold like wet chunam, with great restlessness and anxiety, and uneasy dozing with the eyelids half open and eyes glazed, indicated that dissolution was at hand ; and when the respiration had become decidedly oppressed, the patient never recovered.

In four cases secondary fever supervened ; two were fatal, and two recovered. In three of these the previous collapse was very great, and reaction with difficulty established, and after a large quantity of stimulants had been taken. The first symptom in one case (Calleel Sherriff) was a strong soporific tendency, almost amounting to coma, which I at first attributed to the action of the opium, though rather a smaller quantity than usual had been taken. The patient at first was easily roused and answered questions rationally, but immediately dozed again. The coma gradually increased, with injection of the eyes, and the pulse became more frequent and the skin rather warm. I was then convinced that the brain was affected, and leeches, cold to the head, and blisters were ordered, with strong purgatives, the milder doses having failed to move the bowels, which at length acted, but the symptoms did not yield. The stupor increasing to a perfect coma, and the breathing becoming oppressed, the patient rapidly sank.

The other fatal case was a bheastie, a small, weakly, old looking man, in whom reaction was never fully developed; the pulse becoming imperceptible whenever the stimulants were discontinued, but again rising on their exhibition. He continued in this state until the evening of the third day, when his mind began to wander, and the eyes became slightly injected and pupils rather contracted, skin dry but not hot, and the pulse quick and feeble ; blister to the head and purgatives were freely administered, but he died, before the latter could be got to act, on the fourth day.

The third case (Syed Allowdeen) was very severe after reaction had fairly commenced; on the evening of the day of admission the carelessness of his attendants towards morning permitted him to sink very low. By the most assiduous attention reaction again took place, and was followed by a low typhoid state, with injection of the eyes and slight stupor, constantly dozing, but easily roused, a low frequent pulse and dry hot skin, pain of abdomen, and scanty dysenteric stools. Subsequently an ulcer formed on the left cornea; the blistered surfaces ulcerated, and the right foot became œdematous. The bowels soon became regular and the ulcers slowly healed, but a large collection of matter formed below the right knee, and another on the right arm, the latter appearing to have been caused by resting the arm on the edge of the cot while asleep. This patient slowly recovered and is still very weak, but gradually gaining strength.

The fourth case was very similar to the first, but much milder throughout its whole course, and is doing well.

Two cases of secondary fever also occurred amongst the followers, both young children, and both were in a comatose state, and feverish nearly three days, but recovered.

The proximate cause of this disease appears to be involved in as great obscurity as when the epidemic first broke out in 1817; but numerous predisposing causes may be mentioned, as, the natural weakness of the constitution of the natives, the generally unstimulating nature of their diet, the bad quality of the rice, the quantities of vegetables and *unripe fruit consumed by them*, insufficient clothing, particularly at night, the dampness of their houses and general neglect of cleanliness, &c.; these, by weakening the constitution and deranging the natural functions, will predispose the system to yield to the morbific influence giving rise to cholera.

It is worthy of remark, that during the present attack of this scourge the Europeans at this station have almost been totally free from the disease, which can only be accounted for by their naturally more powerful constitutions and exemption from the causes above mentioned enabling them to withstand the morbific agency, which has proved so fatal amongst those less favourably

situated. When the balance is destroyed by the exciting cause becoming more powerful, (why or how we cannot tell,) or the European constitution feebler from excessive heat, dissipation, &c., then they also may feel its fatal effects as they experienced last hot season.

No circumstance has come under my observation to countenance the idea of the contagious nature of the disease.

Treatment.—Prophylactic measures. These were keeping the lines as clean and dry as possible, and recommending and enforcing, as far as could be done, the same on the sepoys; also pointing out to them the necessity for proper and warm clothing, particularly at night, avoiding damp, bad rice, vegetables, and all kinds of unwholesome food.

In the curative treatment the great point was to get the sick to apply early; but the aversion to hospital which the natives have was too often an insuperable obstacle to carrying this into effect. The objection does not appear to be applied to the medicines, (except perhaps sinapisms and clysters,) for they readily applied for these when their wives or children were taken ill; but knowing the generally fatal nature of the disease, and the dislike of the females to part with their husbands under such circumstances, (though they were permitted under proper restrictions to see and attend the sick if they chose,) frequently induced them to try their own medicines and put off the application for better assistance until too late. Many also, by a natural self-deception, persuaded themselves that their complaint was a simple diarrhœa, until the disease was so far advanced as to leave no doubt of its nature, but great doubt as to their recovery; but whether the patient applied early or late, treatment, with some slight modifications according to peculiar symptoms, was much the same. At first I tried large doses of calomel and opium with the view of soothing and restraining the violent action of the stomach and bowels, followed by a stimulating draught with tincture of opium from 40 to 50 drops, to secure if possible the more immediate effect of the narcotic. I subsequently omitted the large dose of calomel, (except in cases

of great irritability of stomach, when it was given with the special view of its known sedative effects on this organ;) finding that it was only increasing the expenditure of medicines without advantage in those that died, and inducing salivation and great prostration of convalescence in those who recovered, I prescribed a small dose, hoping that, when the violence of the disease abated, it might assist in promoting the return of the various secretions to their natural standard, especially the bilious.

The pill I now usually prescribe is calomel, pulvis capsici áá grs. iv, opii grs. iss. to grs. ij, assafætida grs. ii, which, if rejected, is shortly after repeated; but if retained, and the purging continues, pilul. hydrarg. grs. iv, opii gr. j, or iss., assafætida and pulvis capsici aa grs. ii.; these are repeated while the purging continues, until the patient has taken from 5 to 8 grains of opium, or even ten grains in severe and long continued cases; but from 4 to 6 grains were generally sufficient to check the purging; and, if the stomach would bear it, a draught with tincturæ opii m. xl, spirits. ammoniæ aromat., tincture of lavendar. comp. aa m. xxx, mist. camphoræ vel aquæ menth. pipt. ℥ iss was given, but seldom repeated *with the laudanum* unless in a very mild or severe case; in the former, when the laudanum was thought sufficient of itself to check the purging, and in the latter when required in addition to the pill.

If the patient came in early, stimulants were sparingly resorted to in the first instance, to avoid unnecessarily irritating the stomach; but if the pulse indicated their necessity, or still more decided symptoms of approaching collapse were present, they were freely exhibited. In great irritability of the stomach I have found creosote of advantage, giving from two to four drops in an ounce of water. This draught appears to enable the stomach to bear the pill with which it is given when it would otherwise reject it. When stimulants were urgently required, and the stomach refused the draughts, I have found pills with camphor and carbonate of ammonia retained, combined with opium or not, according to symptoms (my view in giving

opium being simply to check the purging or violent spasms when present). The mixture with brandy and various spices, commonly called "Wallace's Mixture," I have found decidedly useful. The spices appear to suit the native constitution, exciting warmth and increasing the stimulating effects of the other medicines, and at the same time diminishing the tendency to excessive perspiration.

Sinapisms and blisters to the epigastrium appear to be very useful, assisting to relieve the great oppression in that region. I have frequently seen the most marked effects from the application of a large sinapism nearly covering the whole chest after the breathing had been slightly affected.

Injections of opium and acetate of lead have been frequently administered during the height of the disease. I consider them of little benefit, but as is frequently the case after the violence of the purging has ceased, when small watery motions continued to be passed off, these can generally be entirely restrained by an injection. The quantities prescribed were opium grs. iii, or tincture of opium ʒi to ʒii, plumbi acetas grs. x to grs. vi, aquæ, ℥iss. to ℥ii. External warmth by hot sand, frictions, &c. was assiduously employed during the stage of collapse, and I find a large bag of sand laid under the feet highly useful, preventing the patient being so constantly annoyed by the attendants pulling about his extremities to get them into a favorable position for the application of hot bottles, &c.; and here I would observe, that I am persuaded that patients are occasionally fretted to death by the extra and ignorant zeal of the attendants, who, if permitted, will not allow them a moment's rest. The poor sufferer, cramped and aching in every limb, pulls up his leg for momentary ease from change of posture; it is immediately seized by the attendants and again brought straight to the hot sand or bottle; the arm perhaps escapes over the bed, and the whole position of the patient must be changed to rectify this supposed dreadful calamity, instead of simply covering or supporting it, or waiting a little until a voluntary change of position occurs, which is generally soon

the case in this disease. In this manner rest or sleep is totally prevented, and that this may deprive the patient of his chance of recovery will not, I think, be denied. Frictions with ashes, camphor, horse gram flour, &c. as employed by the natives, are useful both by stimulating the skin, absorbing perspiration, and preventing evaporation. The excessive thirst is a most distressing feature of the disease; when indulged it invariably induces vomiting and purging; if not indulged the desire amounts almost to torment. I generally allowed small quantities (not more than an ounce at a time) of ginger tea or warm thin congee, or a drink resembling toast-water made with burnt rice. I have also used the acid drink. After the purging and vomiting have ceased, these are permitted more freely, combined with brandy and water.

When reaction was fairly established little or no medicines were required. A little arrow-root congee or pepper-water and rice, or if very weak a little chicken-soup with spices, was given along with a little brandy, if deemed necessary.

The bowels generally acted freely and naturally within twenty-four hours without the aid of medicine; in some a small dose of blue pill and colocynth of each grs. iv, or castor oil or rhubarb and magnesia, was required.

In the secondary fever, leeches to the temples, blisters to the nape of the neck and head, calomel, purgatives, and diaphoretics, purgative and stimulating enemata, and in those that recovered, quinine, were the remedies employed.

CHAPTER XIV.

Reports on Cholera in H.M.'s 63rd Regiment in 1843, by Dr. Chapman.

It has fallen to the unhappy lot of this regiment to have experienced two visitations of cholera since the commencement of the year, the first in April, the second in November, and in both instances the disease proved nearly equally fatal. The ratio of deaths to treated per cent. were in the first epidemic 42.346, and in the one of this quarter 41.464.

The right wing of the 63rd Regiment, 617 strong, commenced its march for Bellary on the morning of the 11th of March, 1843. The sick amounted to 26, and of these 16 were venereal cases. For four months previously the wing enjoyed most excellent health, the average daily sick being under 24. The left wing marched for Bellary on the 7th of December, 1842. The distance from Poonamallee to Bellary, by the route furnished for our guidance, is 323 miles.

Nothing of any moment occurred on the march, although the weather was intensely hot, till our arrival at Poonganoor on the 27th, when cholera of a most malignant character made its appearance; we had then accomplished 131 miles. There was at the time an easterly wind, which had prevailed for many days. I was fully prepared for the appearance of this formidable disease, having ascertained that it had prevailed to a considerable extent in many of the villages along our line of road; and I heard, on good authority, the previous day that a camp follower was seized with cholera on his way to Poonganoor, and

died in five hours. Three cases were admitted at this place, and all terminated fatally. About nine hours was the average duration of the diseasc. On the following march 1 man was attacked, and died in the same space of time. On the 30th 3 men and 1 woman were attacked, and all died. On the 31st there were 4 admissions, and of these 3 recovered. The marches at this time averaged 11 miles daily. I would observe that the wind changed suddenly to the west, which appears to have influenced the intensity of the disease; for although it continued among the camp followers, the cases were much modified, whereas almost every native previously attacked died. We proceeded on the march without any more cases occurring; the men were in excellent health and spirits. On our arrival at Cogerra on the 7th of April, cholera again made its appearance. One man was attacked and died in the course of a few hours. We had then accomplished 237 miles. The little wind we enjoyed was from the south east; the nights were cool, with light dcw; the days cloudless and intensely hot. The admissions from this time increased daily, but the disease was not so fatal as before.

On the 12th we reached Hoonoor, distant from Bellary about twenty miles. Here orders were received to halt the wing till I could report it free from cholera, the authorities at Bellary fearing we might communicatc the disease to the garrison. The weather at the time was dreadfully hot, and scarcely a breath of air moving. The disease was raging furiously among the camp followers, who were dying in cvery direction. I made application for additional tents and hospital servants, and at the same time stated to the superintending surgeon of thc division my belief that we should never be free from cholera in such an atmosphere, unless we got rid of all our baggage and camp followers. During the 13th, 14th, and 15th, there were thirty-thrce admssions and fifteen deaths. Again I rcpresented our miserable condition, and stated that the experiment of keeping us in camp had failed, and that I anticipated a fearful sacrificc of life unless the men were put under good cover. Thc

heat was now terrific. The thermometer stood in the privates' tents at 111°; in the staff sergeants' at 115°; and in the officers' from 104° to 106°. There was a dead stillness in the atmosphere; not a twig or a blade of grass moved, and many complained of a suffocating sensation. I recommended my commanding officer to change the encamping ground daily, which was accordingly done. A march of three miles on the 17th brought us to Boodial, distant from Bellary only eight miles. Tatties sufficient in number to afford one to each tent were sent out by order of the general; they were useless, there was not a breath of air stirring. There were at this time 34 cases of cholera under treatment. The scene around amongst the native followers was most appalling; they were groaning and dying in every direction, and many without any assistance; for from the general alarm that prevailed, numbers of camp followers, and even private servants, deserted during the night, and found their way to Bellary. On the 18th, between 2 and 9 A.M., 31 cases of cholera were admitted, and Ensign Kennedy was attacked. I then wrote to Major Pole, my commanding officer, and expressed in the strongest language my firm conviction that the entire wing would be annihilated unless the men were immediately put into suitable buildings. About 3 P.M. the Major received an order to march his men into the fort at Bellary that night, and certain instructions to prevent all communication with the other inmates in the fort. At breakfast I was seated next to Captain Pratt, who remarked to me how well he felt considering the intense heat and his anxiety about his company. About two hours afterwards he sent for me; on entering his tent he said, "a deadly faintness has come over me." The nature of his case was, alas! too evident, but the symptoms for many hours afterwards did not assume any serious aspect. I sent him into Bellary as soon as the sun began to decline. Eleven more men were attacked during the day, making in all 42. There were also 30 previous admissions under treatment, giving a total treated on the 18th of 72 men. Of these 16 died at Boodial, and 11 subsequently at Bellary.

The admissions on the march at this time amounted to 120, and the deaths to 58. At Hoonoor, where the order arrived prohibiting us to march into Bellary, the admissions from the commencement of the march were 38, and the deaths 17. We marched at 8 P.M. I never can forget the night; all was gloomy and silent, and for the first six miles the march resembled a large funeral procession. On the 19th 32 cases were admitted. The men were now comfortably accommodated, and the disease at once assumed a different character. It was tractable, and the beneficial effects of medicine were now obvious; 7 only terminated fatally. Early in the morning Major Pole, who commanded the wing, was attacked; his symptoms for twenty-four hours were of a very alarming nature. I remained during the night with Captain Pratt, for my feet and legs were so swelled and painful as to render me unfit for duty for two days; and my place was supplied by Mr. Davidson, the superintending surgeon of the division, who kindly attended Captain Pratt with me. He rallied so much for several hours from the liberal use of champagne, that we began to entertain hopes of his recovery: at 4 P. M. he became suddenly collapsed, which in two hours terminated the career of one universally and deservedly esteemed in his regiment. Ensign Kennedy died at 3 P. M. the same day. On the 20th 18 cases were admitted and 3 died. On the 21st there were 14 admissions and 2 deaths, and on the 22d 8 admissions and 1 death. During this and the subsequent day heavy rain fell, which considerably reduced the temperature of the atmosphere, and the disease may be said here to have subsided. An occasional case occurred in both wings afterwards, but as cholera generally prevails in Bellary at this season of the year, it is, I think, fair to infer that these cases might have occurred had the right wing marched in even in a healthy state.

As far as the contagious nature of cholera is concerned, I must admit I am not even yet a convert to that doctrine. I have certainly during a service of more than seventeen years in India seen some startling facts in its favour. Our marching

into Bellary was attended with none of the ill consequences which the authorities so much dreaded.

The symptoms in all were nearly the same. All at first complained of feeling faint, which was almost immediately succeeded by slight purging and vomiting, and occasional spasm, chiefly of the legs. Sudden collapse ensued; the skin assumed a blueish tinge, became icy cold, and in most instances covered with cold perspiration; the countenance frightfully contracted, attended with deafness and loss of voice. In the majority the purging and vomiting soon ceased. I applied in many instances the stethoscope over the region of the heart, but could not discover the slightest action of that organ, even within two or three hours of the time of attack. The patients remained perfectly tranquil and without even a murmur, when coma, succeeded by dyspnœa, closed the scene. I never saw coma to such an extent in cholera before; it was probably attributable to the high temperature to which in tents the unfortunate victims were subjected. I therefore in some cases tried the lancet, notwithstanding the almost immediate disposition to collapse, but soon relinquished it, as it appeared to me to accelerate death: in none could I procure more than a few ounces of black ropy blood. External and internal stimulants, however powerful, had no effect. Medicine appeared to be utterly inert. Enemata of various kinds were employed, but all to no purpose: the disease set us at defiance, and extorted from us the humiliating confession of our utter inability to contend with such an enemy. During the last three days in camp several men who were quite convalescent from the disease, had a second attack, and sank in a few hours.

The arrangements on the march, made by Major Pole commanding, were most judicious. The men always marched at such an hour in the morning as to arrive at the new ground, and get their tents pitched long before the sun could have any pernicious effects. Half way on each march the wing halted for fifteen minutes to partake of tea, coffee, good English draught porter or arrack. Every attention was paid to the selection of

the encamping ground, away from all cultivation or swamps; as also to the quality of the water. The men were compelled to wear flannel; they were in general but little fatigued; they had no harassing duties to perform, and every thing was observed which could in any way tend to their health and comfort.

The subjoined table exhibits the results of this epidemic. I cannot obtain any accurate account of the number of camp followers attacked; but few applied for medical aid, and preferred dying quietly under a tree; the number of deaths among them is estimated at more than 300.

Table exhibiting the strength, admissions, deaths, and ratio of mortality, in all ranks.

	Officers.	Men.	Women.	Children.	Followers.
Strength	18	617	34	37	No correct return to be obtained.
Admissions	4	196	8	12	
Deaths	2	83	7	5	
Ratio of admissions to strength per cent.	16.66	31.766	23.52	32.45	
Ratio of deaths to strength per cent.	11.11	13.452	20.58	13.51	
Ratio of deaths to treated per cent.	66. 6	42.346	87. 5	41.66	

Table exhibiting the strength, admissions and deaths of each rank from cholera.

	Officers.	Sergeants.	Corporals.	Privates.
Strength	18	28	25	504
Admitted	3	11	6	179
Died	2	5	3	75

The disease paid no respect to persons; the temperate and dissipated, the delicate recruit and the man of athletic form were attacked with equal severity, and death was equally rapid with all. The subjoined tables shew the admissions and deaths according to the number of years' service abroad, with the

strength of each class, and the admissions and deaths according to age with the strength of each class.

Years of service abroad.	Under 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9
Strength	96	54	72	116	50	18	26	38	147
Admitted	34	37	23	17	9	5	15	7	49
Died	14	16	9	8	5	3	7	2	19

Admissions, deaths, and strength of each class, age not exceeding	20	25	30	35	40	45	50
Strength	95	254	146	79	34	9	0
Admitted............	43	75	39	22	12	5	0
Died	18	29	17	11	7	1	0

In concluding this report, I cannot pass unnoticed the very laudable exertions of assistant-surgeon Pratt of the 63rd, as also of assistant-surgeon Wilkinson, H.C. service. Their assistance to me was most valuable, and the duties they had to perform, night and day, from the 13th to the 19th of April, were arduous and harassing in the extreme.

The disease, as it appeared in the 63rd, in November, exhibited no features differing from those detailed in my former report of cholera. Of the 41 cases admitted, in 30 the symptoms were developed early in the morning, a circumstance I cannot account for, except from the admitted fact that life is less vigorous during sleep than at any other period.

Just as the epidemic commenced, I received from Madras an electro-magnetic apparatus, the effects of which in cholera I had long been desirous of testing, particularly so from a conviction, founded on the beautiful exposition of the nervous system by the late Sir Charles Bell, that the nerves, generally speaking, are deeply implicated, but more particularly the eighth pair, the distribution of which to those organs so pro-

minently affected fully accounts, I think, for many of the phenomena of this extraordinary disease. Indeed, I am disposed to consider the eighth pair of nerves as constituting the immediate and central point of action (if I may so express myself) of the poison of cholera, and through the instrumentality of these nerves its deadly influence is imparted to those organs, the healthy functions of which are so essentially requisite for the maintenance of life. Mark its effects on the cardiac and pulmonic plexuses. The action of the heart becomes quickly enfeebled, and in many cases which occurred during the two last epidemics, no action of that organ could be discovered within three hours from the time of attack, even by the aid of a stethoscope. In addition to the rapid diminution of the heart's action, the function of respiration is in a great measure rendered nugatory. Hence, according to the extent to which the heart and lungs are affected, will depend the state of the pulse, the temperature of the body, and the color of the skin. The feeble, squeaking, and unnatural tone of voice, so peculiar to those suffering from cholera, affords another marked indication of the eighth pair of nerves being affected ; the experiments of Morgagni and other physiologists having clearly proved that the act of tying or cutting the recurrent branches of these nerves destroys the voice, "sectis nervis ambobus recurrentibus, vox perit."

There is another important feature in this disease as connected with the nervous system, viz. the altered countenance. This can only be occasioned by the same influence operating on the respiratory nerves of the face, in illustration of which, it is almost unnecessary to mention that numerous experiments on animals have proved that the division of the portio dura of the seventh pair of nerves destroys the natural expression of the countenance. Such are the effects of cholera on the respiratory nerves of the face, on the nervi accessorii, and the fourth pair of nerves, that the face becomes devoid of all animation, and presents an anguished and horribly appalling appearance ; the eye becomes sunk and inexpressive ; the face and neck

appear shrunk and wasted; and the vigorous features of youth soon assume those of senility.

Entertaining those views, most sanguine in my expectations, I set to work with the electro-magnetic apparatus, first making an incision over the region of the heart, and another on each side the neck along the course of the par vagum. In the two first cases in which I employed it, its beneficial effects were quickly apparent. The countenance became more animated, the pulse stronger, and the skin warmer. Electro-magnetic influence was continued, and so marked was the improvement in these cases, that Dr. Davidson, superintending-surgeon, who saw them, concurred with me in opinion that they would terminate favorably. Both, when all appeared to be going on well, became suddenly collapsed and died three hours afterwards. In one case collapse came on during the employment of electro-magnetism; the same occurred in several subsequent cases.

From narrowly watching the effects of electro-magnetism in 35 cases in which I tried it, I should say that life was evidently prolonged by its use in several well marked cases; but as its influence was not permanent, I should depend on it only as a good auxiliary in the treatment of cholera, and fortunately its use does not interfere in any way with the employment of other remedies. Of the 35 cases in which electro-magnetism was used, 20 terminated successfully. To illustrate the remarks I have made, subjoined are two cases extracted from the cholera register, viz. the first fatal case, and the first successful one which occurred during its use.

Case 1. *Private John M'Carthy, aged* 25, No. 5 Company; admitted 10th November, 1843.

Admitted 2 P. M., having been attacked about two hours previously in barracks with purging and vomiting. He states that he felt faint two hours prior to the vomiting; his eyes are sunk, voice weak and shrill, skin cold and clammy. Pulse small and very weak; complains much of pain and noise in the ears, great thirst and heat at the epigastrium. The stools passed since coming to hospital are congee-like; has vomited some tasteless fluid twice; has only just now had spasms of the legs.

The electro-magnetic apparatus being ready for use, an incision was made over the region of the heart, and another in the direction of each par vagum. One pole was applied to the cardiac incision, and the other to the incision over the eighth pair of nerves. The poles were subsequently applied along the spine and over the large abdominal plexuses, and continued at intervals till nearly six o'clock. Its influence was very apparent; the countenance became more animated, the pulse more distinct, and the arms dry and warm; the purging ceased, but the irritability of stomach continued.

℞ Hydr. submur. gr. v, pulv. camph. gr. iii, secundâ quâque horâ. Appl. empl. sinapis abdomini, enema terebinth. secundâ quâque horâ. Brandy ℥ii.

Creasot. gr. vi, aquæ menth. pip. ℥iss, statim.

Five o'Clock. The creosote has quieted the stomach; there has been no purging. Skin tolerably warm; complains much of thirst; keeps himself quiet in bed.

℞ Creasot. gr. vi, aquæ menth. pip. ℥iss, statim. Continue enema terebinth. Brandy one measure.

Six o'Clock. Remains in nearly the same state. Cont.

Seven o'Clock. Is by no means so well; skin more cold and disposed to moisten; pulse very indistinct; eyes sunk; respiration hurried. Electro-magnetism was again immediately employed, and its influence over the skin and pulse was for some time very apparent. The action was kept up, but in the midst of favorable anticipations he gradually sank into a state of complete collapse. The electro-magnetic process was continued, but it did not excite the slightest influence, and he sank at half-past 11 o'clock, having been in hospital nine hours and a half.

There was no opportunity for post-mortem examination.

Case 2. *Private George Harris, aged* 21, No. 1 Company; admitted 11th November, 1843.

A steady, healthy, young man; admitted at 2 A. M; says that he slept soundly till 1 o'clock, when he awoke, wanting to go to the privy. On his return to the barracks he was again attacked with purging, and was obliged to dirty his clothes; he then sent for a dooly to take him to hospital; he was very cold on admission; countenance much contracted; hardly any pulse; thirst urgent; spasm of the legs very severe.

Sinapism. abdomini, enema salin. calid. o. h.

℞ Spirits. ammon. aromat., tinct. zinzib. āā ʒj, ft. haust. Hydrar. submur. gr. iv, pul. camph. gr. iv, tertiâ quâque horâ.

Eight A. M. Powerful electro-magnetic shocks were passed all over the body, and the action kept up for more than an hour and a half, with very decided advantage; countenance improved; skin tolerably warm; pulse stronger; has passed four copious congee like stools; no vomiting.

℞ haust. aromat. ut antea; cont. pil. calomel. et camph. et enema salin.

Noon. Appears to be going on very favorably; has less purging; the stomach has retained some thin sago; remains very quiet; slight thirst. Cont.

Vesp. Slept for an hour in the afternoon; bowels quiet; pulse natural; skin warm; countenance good.

Pil. hydr. grs. v, pul. camph. grs. iv, opii gr. i.

Slept soundly till 2 A. M., when he awoke feeling very cold, and immediately purging came on. I saw him at 3 o'clock and found him just in the same state he was in on admission; skin very cold; countenance contracted; weak shrill voice. No pulsation discoverable anywhere. Electro-magnetism again employed for nearly two hours, during which time the pulse rose; the voice became clear and distinct. Skin much warmer and purging less.

Enema salin. calid. o. h. ℞ æther. sulph. ʒi, spirits. ammon. aromat. ʒi, mist. camph. ℥i, ft. haust. Brandy, measure 1. ℞ hydr. submur. gr. iv, pul. camph. gr. iv tertiâ quâque horâ.

Noon. Appears to be again going on favourably.

Vesp. Has less purging; stools of a pale yellow colour and very watery; skin warm; pulse rising.

13th. Countenance nearly natural; voice distinct; slept for four hours; has taken a little thin sago and port wine; appears to be going on very satisfactorily; bowels quiet.—Rept. calomel. et camph. noct. maneque.

Mid. Has been very easy.

14th. Complains much of debility; retains all his nutriment; stools are becoming slightly feculent; pulse weak but very regular.—℞ pil. hydr. gr. iii, pul. camph. gr. ii, opii gr. ss. ter die.

Vesp. Improves; one healthy stool.

15th. Gains strength slowly; has no unfavourable symptom; takes all the food requisite for him.—Cont. brandy 1 measure.

16th. Passed a good night; is going on well.—Capt. pil. i, nocte et mane.

17th. Improving; bowels regular; tongue clean.—℞ infus. cheryettæ bis die; 2 measures port wine.

19th. Convalescent.—Cont.

20th. Discharged.

CHAPTER XV.

Cases of Cholera, in which Cantharides was employed internally, in H. M.'s 26th Cameronians.

Case 1st. Private Walter Cowan, aged 20, jeweller. Admitted 29th December, 1828. Received into hospital at a quarter past 5; states that at 2 P. M. he fell sick, had vomited, and was purged. When seen, he had headache, a hot skin, thirst, flushed countenance, and strong pulse, with anxiety, a hurried manner, and extreme depression of strength. On drinking a little congee-water vomiting ensued, of a lightish grey-coloured fluid, having lumps in it, apparently of curdled milk; extremities flaccid and feeble; integuments of fingers shrivelled; pulse barely felt; eyes sunken and turned up; cramps occasionally of feet and legs; thirst urgent; two stools congee-like.

Venesectio ad ℥ xx.—Habeat hydrarg. submur. ℈ i.—℞ tinct. opii, spt. ammon. arom. āā ʒ i, statim sumend.—Spt. gallic. in aquâ tepidâ partitis vicibus.

Six P. M. Imponatur vesicatorium præcordiis. Frictio et ablutio tepida usurpantur. Habeat tinct. lyttæ ʒ i statim.

Half-past 6. The lytta was rejected; cramps continue; calomel retained; extreme restlessness.

Quarter to 7. Has just passed a copious congee-like stool in his bed; pulse more distinct; no vomiting for half-an-hour.

Pergat in methodo medendi. Spt. gallic. pro re natâ, frictio et ablutio. Repetatur tinct. lyttæ ʒ i.

Seven P. M. Has taken the draught of lytta and retained it; free from cramps; dozing; pulse exceedingly feeble.

Repetatur haust. lyttæ, et capiat calomelanos ℈ i.

Half-past 7. In the same state; second draught retained with the calomel. Pergat ut antea.

Eight P. M. Spasms continue; body and extremities of natural temperature; pulse barely perceptible; retains the medicine.

Repetatur haust. lyttæ et in semihorâ calomel.—Injiciatur enema ol. terebinthinæ.

Quarter past 8. .Had two stools after the enema, congee-like; pulse unaltered, as well as the surface.

Repet. haust. et calomel. Continuenter alia.

Nine P. M. Very restless; no purging or cramps; body and extremities continue warm; calomel and lyttæ retained. Repetatur haust. et calomel.

Quarter past 10. Spasms of his legs have returned; incoherent and very restless; pulse imperceptible; extremities cold; dreadful thirst; conjunctiva much injected; oppression of the chest; no vomiting or purging.

Pergat in method. medendi. Haust. ut supra et calomel. ℈ i.—Spt. gallic. frictio et ablutio.

Twenty min. to 11. Comatose; unwilling to be disturbed. Fricantur crura ung. hydrargyri camphorat. Tinct. lyttæ ut supra omni horâ.

Quarter past 11. Has just voided a copious stool of a congee-like appearance in bed; spasms recur freqûently; is very restless and incoherent.

Twelve P. M. Still very restless, but free from spasms; no vomiting or purging; pulse and skin as before; medicine retained.

Habeat iterum calomel. ℈ i. Continuenter alia.

Quarter past 12. Has passed another congee-like stool in bed.

Thirtieth, 1 A. M. Has just taken a draught of tincture of cantharides and brandy; restlessness continues great; breathing very laborious; no vomiting or spasms; no pulse felt; extremities still cold; thirst urgent.

Habeat hydrarg. submur. ℈ i. Repetatur haust. lyttæ. Contin. sps. gallic. frictio, et ablutio tepida.

Two A. M. Great restlessness continues; retains the medicines.

Half-past 2. In the same state. Contin. method. medendi. Repetatur calomel.

Three A. M. No return of spasms or vomiting; otherwise the same; breathing much oppressed. Pergat.

Half-past 3. As before; passed one congee-like stool.

Five A. M. Very laborious breathing; great tossing about; no spasms or vomiting.

Half-past 5. Dead.

Inspectio cadaveris post horas septem. Head not examined.

Thorax.—Contents natural; blood contained in all the vessels very dark and half coagulated: much fibrine in the right auricle.

Abdomen.—Abdominal muscles highly tense and so spastic as to oppose great resistance to the knife. The small intestines on being exposed bounded up suddenly; they had a faint reddish blush, and were lined throughout with the usual glutinous white secretion. Here and there, especially in the ileum, an intus-susceptio was found to the extent often of an inch. The large intestines were universally and irregularly contracted, and contained the same altered mucus. Liver very soft, and universally studded with circular dirty white spots when cut into, as if they consisted of round tubercles, perfectly soft as the sur-

rounding parenchyma of the viscus. Bile scanty, thick, and black. Bladder empty and much contracted.

Case 2.—*Private James McIntosh, aged* 25, *a labourer.* Admitted 14th December, 1829. Has an ulcer on the internal prepuce, size of a split pea; surface irregular and foul, edges raised, base thickened; there is also a small superficial ulcer on the glans, observed five days ago, contracted five days previously; bowels open.

Habeat haust. purgans statim; lotio zinci sulphat. ulceri.

16th. No seeming change on the sores.

Fricetur ung. hydrarg. ʒi mane et vesp. Lotio nigra ulceri.

18th.—Was seized suddenly at ten last night with purging of watery stools, followed by vomiting of bitter fluid three hours afterwards, together with spasms affecting the feet, extending to the legs and thighs. This was not discovered till the hour of visiting this morning, when the following symptoms presented:—pulse about ninety, very obscure; tongue cold; great thirst; frequent retching and vomiting of tasteless fluid; eyes sunk and surrounded with a livid circle; countenance pale and anxious; ringing in the ears with uneasiness and confusion of head; restlessness and sighing; extremities partially cold; voided some urine about one; bowels previously regular.

Habeat zinci sulphat. ℈ij statim. Frican. partes affectæ c. liniment. terebinthinæ.

Nine A.M.—Vomited nearly a quart of dark insipid fluid about ten minutes after taking the sulphate of zinc, and felt much relieved; the pulse became stronger, and his extremities warmer. Was ordered brandy ℥iss., tincture of cantharides ʒi, every half hour, which has been partly rejected; spasms continue to recur at intervals commencing at the toes, and extending to the thighs and hip joint of the right side, inducing much restlessness; thirst less urgent; sense of deafness with ringing in the ears continues; no stool.

Contin. haust. c. tinct. lyttæ omni semihorâ, et frictio pro re nata.

Half-past ten.—Nothing is now retained in his stomach; pulse indistinct; countenance more collapsed, and extremites colder; partial shrinking of the fingers; occasional deep sighing; spasms ceased; still no evacuation by stool.

Capiat zinci sulphat. ʒss. Injici. enema terebinthinæ. Nitric acid blister to the region of the stomach. Cont. linimentum.

Noon. The sulphate of zinc was retained a quarter of an hour; vomited a considerable quantity of the same kind of fluid as noted at nine o'clock; three scanty congee-like evacuations; oppression about the præcordia; anxiety and restlessness prevail; pulse as last reported; spasms continue to recur at intervals, but are less severe; hands cold but dry; the lower extremities warm.

Habeat liquor. arsenicalis ♏ xl. ex aquâ cinnamomi.

Two P.M. Vomited the arsenical solution; was afterwards ordered ʒi of sulphuric æther, which he also rejected; spasms still continue in the lower ex-

tremities; restlessness and thirst continue; pulse still very small and weak; surface cold; wishes for some beer.

℞ ammon. carbon. gr. x, opii gr. ij; capiat in formâ boli. To have some beer.

Four P.M. The bolus was immediately rejected; relished the beer, and has vomited little since; only one stool of the same congee aspect; has remained free from spasms; other symptoms as before; has taken a little brandy and sago several times, which is retained. Continue the brandy and sago.

Half-past five P.M. Countenance more oppressive; eyes less sunken; skin cold, with but little shrivelling of the fingers; pulse small but firm; vomiting less urgent; appears to retain portions of the brandy and sago; disposed to doze; occasional deep sighing. Continuenter.

Eight P.M. He now rejects every thing he swallows; one stool of the same description; disposition to doze continues; no recurrence of spasms; pulse continues as last noted; skin becoming warmer; thirst less urgent. Pergat.

Ten P.M. Slight return of spasms in the right leg; vomiting continues; one stool similar to those above noted. Idem.

19th, Two A.M. Still frequent vomiting, but he retains some of the beer; two scanty stools of the same appearance; occasional slight spasms in the calves of the legs; pulse, skin, &c. as last noted. Idem.

Five A.M. Has slept none; no stool; vomiting still continues; had slight spasms in the legs and feet two hours ago; pulse continues small and weak; skin cold; thirst unabated; sense of ringing in the ears has ceased. Contin.

Eight A.M. Took some mulled wine, which he immediately rejected; no recurrence of spasms; no stool; pulse just perceptible; voice low and indistinct; hand and arms cold; but the body and lower extremities retain nearly their natural warmth. Continuenter.

Noon. Has swallowed some brandy and arrow root; complained of uneasiness in the lower belly about ten. An emollient enema was exhibited, and fomentations were employed, which produced immediate relief. One stool, still congee like, about ten minutes after the exhibition of the enema. Pulse now barely perceptible; breathing more oppressed; features and eyes more sunk; and the hands and face have assumed a partially livid aspect; the former deadly cold, with increased shrivelling of the fingers; slight recurrence of vomiting; thirst continues insatiable; voice scarcely audible.

A little warm brandy and water occasionally. Repet. haust. c. tinct. lyttæ ut antea necnon. Repet. enema terebinthinæ.

Four P.M. Retained the turpentine enema about a quarter of an hour; was afterwards ordered one containing tincture of cantharides ʒvi, which was almost instantly discharged; rejected the brandy and tincture immediately it was swallowed; no vomiting since; no return of spasms; pulse, skin, &c. as last noted. Applic. emplast. lyttæ spinæ dorsalis. Continuenter alia.

Eight P.M. Occasional vomiting continues; no stool, no spasms; but he has

become very restless within the last hour, and the respiration is still more oppressed; pulse extremely small and feeble; hands and face cold; the lower extremities have also become colder, and the livid hue has extended. Pergat.

Midnight. No pulse; great restlessness and tossing from one side of the bed to the other; breathing more laborious; appears comatose with the eyelids partially closed; no stool, and no vomiting since last report; has taken equal portions of hot brandy and water every quarter of an hour. Idem et repet. enema terebinthinæ.

20th, Five A.M. Has taken the brandy and tincture of cantharides every half hour; the stomach appears paralysed; all is now retained; enema kept about three minutes; one stool of the same aspect; in other respects as last noted. Pergat in usu tinct. lyttæ. Repet. enema.

Eight A.M. The injection has not been discharged; the whole alimentary system seems deprived of vitality; fatal restlessness continues; coldness and lividity of the surface extending; eyelids continue partially closed; still makes signs for drink. Continuenter.

Vespere.—The breathing became more and more oppressed; and as the vital functions declined, the restlessness equally decreased; refused every thing, and he finally sank at twelve noon.

Sectio cadaveris.—Thorax. On exposing the thoracic viscera, the lungs were found gorged with black blood; the blood in the left side of the heart as dark as in the right; no fibrine in the right auricle.

Abdomen. Peritoneum, omentum, and intestines presented a beautiful arborescent reddish tinge throughout, while a strong odour of turpentine was emitted. On handling the intestines, the fingers became covered with an adhesive mucilaginous mucus, rendering a hold of the scalpel difficult. On cutting into them in various parts, they were found to contain a reddish frothy mucus. The sigmoid flexure of the colon was much contracted and empty. The bladder could scarcely be laid hold of, so closely were its tunics drawn together. The liver, on different sections being made, emitted much dark blood; and the gall-bladder was much distended with thick dark bile. Stomach in usual condition, no traces of inflammation being remarked.

Case 3. *Private Alexander McKenzie, aged* 23, *a labourer.* Admitted 24th July, 1829. Of a strong healthy habit of body.

6 P. M. Reports having been seized early this morning with a sense of cold, followed by severe headache and general uneasiness, which latter symptoms continue; skin moist; pulse 72 and rather full; tongue clean; thirst considerable; bowels from report regular. Fiat venesectio statim. Utatur solutio magnes. sulph. c. antim. tartar. ex infus. amar.

Half-past 10. Twenty-five ounces of blood taken, of a healthy appearance, with much relief to the pain in the head. The solution produced frequent vomiting of green bitter fluid, and five stools of a liquid yellow appearance. Has

been seized within the last ten minutes with severe pain of a spasmodic character across the upper part of the abdomen, followed by extreme restlessness and violent spasms in the feet and legs. Pulse very small and scarcely to be felt; surface cold and bedewed with clammy perspiration, especially about the arms, breast, and face; thirst excessive; eyes sunk, features collapsed; respiration oppressed, anxious, and accompanied with frequent deep sighing.

℞ ammoniæ carbon. gr. xv, tincturæ opii ʒi, aquæ cinnamomi ℥ij, m. sumat statim; acidulated barley water for common drink; frictions with turpentine liniment over the parts affected with spasms; surface to be sponged with acidulated warm water.

Eleven P.M. An agreeable sense of warmth experienced after taking the draught, which was further excited by a little hot brandy and water. Vomiting, however, occurred in about a quarter of an hour, and apparently the whole contents of the stomach were ejected; this was speedily followed by a copious dejection of a congee-like appearance; while at stool he fainted. Considerable restlessness and anxiety prevail, with occasional spasms of the lower extremities; but the pain in the abdomen has ceased; pulse rather more distinct; profuse cold exudation continues over the face and neck; intense thirst continues. Sinapisms to be applied to the soles of the feet and inner sides of the legs. Hot brandy and water to be continued.

Twelve P.M. Has taken the brandy and water every half hour; no recurrence of vomiting, purging, or pain in the abdomen, but occasional severe spasms in the feet and calves of the legs: pulse 120, small, but distinct; general heat increasing; no urine since the commencement of the attack. ℞ tinct. lyttæ m. L. spt. gallic., aquæ calidæ āā ℥ ss. m. capiat omni semihorâ.

25th, One A.M. Slight spasms in the left hand and fingers half an hour ago, relieved by the friction; still no vomiting or purging; pulse becoming stronger, and heat more diffused. Pergat.

Three A.M. Has continued free from spasms; the sinapisms are occasioning considerable irritation; no return of vomiting or purging; pulse 108, still increasing in strength. Continuenter.

Five A.M. No recurrence of spasms, vomiting, or purging; the sinapisms causing great uneasiness. Repet. haust. c. tinct. lyttæ secundâ quâque horâ. Sinapisms to be removed.

Seven A.M. Vomited a little after taking the draught at five; eyes much suffused; surface now generally warm; considerable redness inside the legs from the sinapisms; pulse 110, of good strength; thirst abated; still no stool; has voided a few drops of urine without pain; says he feels quite easy. Omitt. medicamenta.

Nine A.M. Continues as last noted; no stool; no urine voided.

Noon. Vomited a little fluid about an hour since; one scanty dejection of a whitish appearance; passed a little urine several times without pain. Habeat hydrarg. submur. gr. x, statim, et post horas tres olei ricini ℥ i.

Half-past 12. Rejected the oil almost immediately after swallowing it. Habeat olei ricini ℥ss. et spt. gallic. ℥ ss.

Two P.M. No return of vomiting; two liquid fætid dejections since taking the oil, of a yellow colour; some sinking of the pulse, and coldness of the hands and forehead, which are covered with clammy moisture: eyes less suffused; has again voided urine. Habeat vini rubri ℥ iss. ex aquæ calidæ ℥ i, statim, et repetatur secundâ quâque horâ.

Vespere. One dejection similar to those last noted; strength of pulse restored with natural warmth; forehead bedewed with warm sweat; passed some urine; is at present sound asleep; breathes freely. Continuenter.

26th. Only slept about half an hour, and has obtained no sleep since; no return of spasms, but respiration is still somewhat laborious; pulse 100, of good strength; surface natural; thirst still urgent; one yellow liquid fetid stool; voids urine freely; eyes still somewhat suffused. ℞ hydrarg. submur. gr. iij, opii gr. ss. m. tertiâ quâque horâ sum.—Sumat haust. purgans h. s., et injic. enema purgans cras mane.

27th. Vomited the purgative draught; he was therefore ordered an ounce of castor oil swimming on a little brandy, which was retained near an hour, when he again vomited. The purgative enema was exhibited this morning, but no evacuation has followed; slept some in the night; pulse 92, full; respiration quite natural; the redness of the eyes disappeared; only complains of debility; thirst still considerable. Habeat hydrarg. submur. ℈i statim. et enema terebinthinæ quam primum.

5th. Discharged.

Remarks.—In the cases of collapse, beyond all comparison the most fatal, I have still to speak favourably of the tincture of cantharides; any specific effect which I might be induced to ascribe to this preparation when exhibited in this disease I cannot pretend to explain. That it is a highly stimulant and heating medicine is well known; and when taken in large doses this effect is almost instantaneous and general, and not on particular organs, as is evinced when the quantity given is small. So far as my experience sustains me with regard to its action in the above species of cholera, the female system appears more susceptible of its operation, and the benefit resulting is paramount.

CHAPTER XVI.

Report on Cholera in H. M. 30th Regiment in 1828, by Samuel Dickson, Esq.

H. M. 30th Regiment, 930 strong, left Trichinopoly on the 7th of October, 1828, carrying with it all its sick. The marches were commenced generally at 5 o'clock in the morning. The only casualties that occurred betwixt Trichinopoly and St. Thomas's Mount, where the corps encamped on the 4th November, were four cases of dysentery, one of carditis, and one of inflammation of the stomach. The weather all along was extremely favourable.

On the 12th November a bandyman (carter) of one of the soldiers was seized at the Mount with cholera, but not having been seen till twelve hours after its first invasion, he died.

On the 13th a soldier affected with the same disease was received into hospital. The patient was treated with stimulants by Assistant Surgeon Adams, and recovered.

On the 14th the regiment, to the number of 450, left the Mount, where they had remained encamped for ten days, having in the interval sent to Madras and Poonamallee 480 volunteers, inclusive of seven sick, transferred to the general hospital. No accident took place till the third day's march, when two men who had been seized early in the morning with cholera were brought into Wallajahbad, where they expired. Venesection was performed in both instances, but without effect; the blood only came away in black drops. Hot brandy and water with laudanum, and small doses of carbonate of ammonia, were

administered, and recourse was had to shampooing and nitric acid blisters with equal ill success. Several native camp followers of the 30th were also attacked.

On the evening of the 20th no less than twelve cases of the disease were admitted to hospital, five men and seven women. At their first admission venesection was performed in some, and in all hot water blisters were applied to the abdomen, while small doses of brandy and water with laudanum were administered from time to time. Scruple doses of calomel were likewise given frequently. So fatal, however, was the disease that before morning no less than five corpses lay in the dead house. Fresh admissions were received from day to day, and not a day passed without one or more deaths. In three or four cases the vomiting and purging were stopped by 10 gr. doses of alum, but these patients did not recover. The dissections in every instance gave proofs of the highly inflammatory nature of the disease. The stomach and bowels were in a complete state of inflammation; in two cases the small intestines were internally coated with matter resembling pus.

As the gall-ducts in every dissection were found completely closed, it occurred to the medical officer in charge, that the vomiting, instead of being checked, ought, on the contrary, to be promoted. Emetics, it appeared to him, were likely to do good by emulging the ducts of the liver, besides stimulating the stomach to throw off its load of blood, and thereby determine the circulation to the skin. Scruple doses of ipecacuan were accordingly administered, and the practice appeared to be attended with more success. The misery, however, was, that the generality of those admitted had been attacked many hours before being reported; and from this cause it is believed many cases terminated in death which, if they had been brought timely into hospital, might have recovered. Venesection was now tried in almost every case, but in most the blood flowed in such small quantities, and so slowly, that the few ounces lost could not in the least be supposed to influence the disease. In one man (a sergeant) little or no blood came away from

either arm; but a considerable quantity was obtained from venesection in the feet while immersed in warm water. This man has since recovered.

In two instances arsenic was given in doses of 20 drops of Fowler's solution; it did not appear to have the slightest influence on the system.

The disease still raging, the commanding officer was recommended to encamp the regiment, which was accordingly done.

On the 22nd November the regiment left the barracks, with the state of which, on the first arrival of the corps, both the medical officer and the quarter master had reason to be extremely dissatisfied, although it was considered nevertheless better to march in the men than keep them longer under canvass. The regiment encamped on the highest ground in the neighbourhood, but very little advantage appeared by the step; the disease continued to rage more or less till the 2nd December, when the last case occurred.

The deaths have been in all twenty-three; seventeen men, three women, and three children, exclusive of natives. It is worthy of remark, that the once having had the disease is no safeguard against the second attack. A man of the name of Parker died of cholera on the 27th November, 1828, who about nine months before at Trichinopoly recovered from the disease. His case was extremely well marked.

Although the cholera has stayed its ravages amongst the soldiers, the camp followers of the regiment still continue to be attacked. Several of the hospital servants have had the disease. One of the toties died on the 6th, and some of the officers' servants have likewise been sufferers. There has been only a single case among the officers themselves, twenty-three in number; and this was not very well marked, the ejections from the stomach and bowels being bilious.

As the ground to a considerable distance around Wallajahbad is of a low marshy description, it was impossible to shift the camp, and a standing camp being an evil in itself, the commanding officer has ordered the men this day into barracks,

having previously got them cleansed and whitewashed. It is to be hoped that the step will be attended with advantage.

As it is only by collecting the facts and observations of many that the true cause of cholera can be discovered, the medical officer in charge of H. M. 30th offers no apology for stating the result of any observations which the too fatal nature of the disease has unfortunately given him an opportunity of making.

To him cholera appears to be a modification of ague, yellow fever, jungle fever, and plague,—produced, in a word, by a more intense concentration of the antivital gases which escape in the decomposition of animal and vegetable remains. The disease, like ague, has been observed to confine itself principally to low countries, and, like the jungle and yellow fevers, to be most prevalent in uncertain weather; when rain and heat, for example, succeed each other alternately. In its appearance and destructiveness it resembles plague very closely. A French writer quoted by Pringle, describing the true plague as it appeared at Aix in Provence, characterizes it thus: "Cette maladie commence ordinairement par un froid, avec douleur de tête, abattement des forces, et envie de vomir, un feu brulant dans les entrailles, une soif ensatiable—le pouls concentré."

Is not this a description of cholera? And again the same author says, "il arrive, mais rarement, que le mal se masque par tous les signes d'une fièvre double tierce; et ce dequesement dure tout au plus jusq'au troisième accés, et alors il se demasque par tous les symptômes susdits de peste, tant interieurs qu'exterieurs." Here then is a similarity to the intermittent. It is true that cholera sometimes breaks out in situations and seasons different from those above described, but so do plague and ague. Decomposed vegetable and animal substances may be conveyed into the system in various ways. It matters not whether the poison be inhaled by the lungs, or imbibed by the open pores of the skin in an aerial form on low marshy grounds; or, in situations less suspected, be received into the stomach and intestines in a more palpable shape by means of impure

food, (mouldy rice for example,*) it is still conveyed to the system, and the disease is the same, differing perhaps but in degree. The fact is curious that both the food of plants (decomposed vegetable or animal remains), and the air they breathe (carbonic acid gas), are equally destructive of human life. The similarity of the symptoms of cholera to those which occur in persons who have swallowed mineral and vegetable poisons is exceedingly striking.

The sinking of the countenance, the vomiting and purging, spasms and coldness of the extremities, are equally observed in a patient attacked with cholera, and those who have been poisoned with tobacco, arsenic, or nux vomica. The bite of a cobra produces the same effects; and dissection shows the same appearances. Each of these poisons produces a change upon the blood, which in its turn influencing the brain, this organ sympathises with the system of sympathetic nerves which supply more or less the whole viscera of the thorax and abdomen; or, it may be vice versâ, the nerves of the stomach and lungs may receive the first shock, and the brain be secondarily affected. A universal spasm is in either case produced; the gall ducts (muscular I presume them to be) become first closed from this cause, and if the disease continues, inflammation soon renders them impervious. The stomach and rectum spasmodically dash out their contents in the manner of a syringe, and the lungs, whether from spasm or from being over-gorged with blood, or from a change in the blood itself,† which may render combination with the oxygen of the atmosphere impossible, are unable to perform their office. The blood passes through them

* It is remarkable that while many of the native camp followers of the 30th have been attacked, the disease has not appeared amongst the other natives in the cantonment. Each regiment has its bazar; may not bad rice sold in the one, and not in the others, account for this? On examining the riee sold in the 30th bazar it appears to be a mixture of old and new; and it had a mouldy smell.

† During life in two eholera patients, the medical officer in eharge has observed bubbles of air issue from the orifiee of the bleeding vein, and immediately after death he has seen the vein partly filled with air. Does not this shew a decomposition of the blood?

to the left side of the heart, black and viscid; thus it is that the patient dies in a state of asphyxia.* He is like a person strangled. If the sufferer recover from the first invasion of the cholera, it is by a similar process to that which takes place in ague. The blood returns to the extremity, the skin becomes hot, and after a time a profuse perspiration gives relief. The greater injury, however, which in cholera the whole viscera have sustained renders the fever of a more ardent nature; and hence it is that a patient occasionally lingers for a time and dies at last of abscess of the brain or liver.

In every case which was examined, (and with three exceptions all the men who died in the hospital of H. M. 30th Regiment were examined,) the gall ducts were found completely impervious. The gall-bladder, though full of bile, when squeezed by the hand allowed not a drop to pass. In the bowels of one subject only was bile found, and it was remarkable that in life he had passed bilious evacuations; still his gall-bladder was found gorged with bile, and the ducts were not to be forced in any way. In general the appearance of bile in the fæces was looked upon with pleasure as a happy symptom, and the case above alluded to was a singular instance to the contrary.

With regard to the treatment of cholera it appears to the medical officer in charge that the first indication is to bring the blood back to the surface. If the patient be received into hospital within the third hour, a cordial and bleeding are the most likely methods to produce this effect. If, however, the skin is already shrunk and cold, an emetic may succeed when stimulants would only increase the inflammation which so soon supervenes.

Venesection† in every case, it appears to him, ought to be

* This is proved from having opened the *femoral* artery of a man a short time before death. The blood at first came away in a jet, but black as pitch, and then slowly oozed away as from a vein.

† As our readers may not recognise in the foregoing report the writings of the author of the "Fallacies of the Faculty," we beg to inform them that Mr.

tried, because, if blood will flow in sufficient quantity, there is every hope; and if it only come away in a few ounces, it can neither influence the disease for the better or the worse. He does not look upon the disease as one of sinking; it resembles rather slow strangulations and apoplexy. The first indication in the case of a drowned man is to open the jugular and attempt artificial respiration, to employ stimulating frictions, and administer cordials. The same ought to be the treatment in cholera.

It is remarkable that a cordial more frequently restores the natives than the Europeans. The reason is not obscure. The inflammatory stage in the native does not come on so rapidly; and the European is so accustomed to ardent potations that even pure brandy will fail to stimulate his stomach unless inflammation have already supervened, when it is to be feared the disease will only be rendered worse. Emetics perhaps may be more useful. Congestion of the head might be urged against their employment, but Cullen says expressly, "I do not remember in the annals of physic a fatal apoplexy produced by vomiting." Speaking of emetics generally, he adds, "the bad effects of vomiting are precarious, the good undoubted."

Dickson, assistant-surgeon of H. M. 30th Regiment, is one and the same with *Sam. Dickson, M.D., late of the Medical Staff*, author of the "Fallacies of the Faculty," and the "Chrono-Thermal System."

Looking at this report on cholera, with reference to the number of deaths to the sick treated, and the plan of treatment pursued, we cannot help thinking that Mr. Dickson has drawn some of the vivid pictures of the awful effects of blood-letting from it. At page 100 he says, "Look at the pale and ghastly faces of the inmates of these hospitals; listen to their groans, their sighs, and observe the pupils and attendants with the bandage and basin, ready to take the quantity of *life-blood*, which solemn Pedantry prescribes as the infallible means of relieving suffering." Again he says, "How few the diseases which loss of blood may not of itself produce." "Asiatic cholera! Gentlemen, the symptoms of that disease are the identical symptoms of a person bleeding slowly away from life! The vomiting, the cramps, the sighing, the long gasp for breath, the leaden and livid countenance which the painter gives to the dying in his battle pieces, these are equally the symptoms of cholera and loss of blood." Dr. Dickson ought to have shown his readers the concluding short table as an illustration of this.—S. R.

State of men, women, and children treated for cholera in the hospital of H. M. 30*th Regiment, from* 13*th November to the* 2*nd December,* 1828, *inclusive.*

	Admitted.	Recovered.	Died.	Remaining.
Men	20	3	17	3
Women	8	3	3	2
Children	6	2	4	0

CHAPTER XVII.

Remarks on the Cause of epidemic Cholera, with Suggestions for its Prevention in Marching Regiments, by J. Kellie, Surgeon, 4th Battalion Artillery.

I assume that the essential cause of cholera resides in the atmosphere, but that it requires something in addition to this atmospheric agency to generate the disease, or rather to attract it from the air, and give it upon earth a local habitation.

The adjuvants to the invasion of cholera are, the congregation of large masses of people, the decomposition of animal and vegetable substances, imperfect ventilation, fatigue, exposure to vicissitudes of temperature, insufficient or unwholesome food; indeed, whatever debilitates or deranges the system acts as a predisposing cause to this disease, as it is a fact borne out by the most incontrovertible evidence in Europe as well as in Asia, that cholera is generated amongst a people, and attracted and retained by them, in proportion as they are surrounded and affected by these predisposing causes.

During the prevalence of any epidemic other diseases often disappear or become changed in their character, and assume the symptoms of the prevailing epidemic. Thus, during the prevalence of plague, all other complaints have been known entirely to disappear; and, on the invasion of cholera, other diseases are less frequent, and febrile and dysenteric complaints have always a tendency to run into cholera; and it was remarked, when the sweating sickness raged in England, that other complaints assumed the sweating character. Now, each

of these instances,—and many others might be adduced,—clearly indicates the existence of a general pervading morbid influence, and is not the less to be believed because we are in ignorance of its source or nature.

But of whatever nature this atmospheric change may be, although we are unacquainted with its origin, and it is too widely diffused to be avoided, we nevertheless possess the power of neutralizing its baneful effects, and of rendering its operation comparatively innocuous; for by the adoption of an active system of health police, and the removal or avoidance of all those causes which occasion a predisposition of the body to take on morbid action, we would in most instances effectually ward off an attack of cholera, and in others arrest its progress after it had appeared.

I do not believe cholera to be contagious under any circumstances, but I do believe that when the pestilence has once been attracted to a town or camp, the atmosphere becomes tainted, and all who come within its influence are liable to be attacked. Cholera is therefore, in my opinion, an infectious disease, but only so when the poison is rendered virulent by numbers, or where the predisposing influences abound. Its infectious power appears limited to the locality where it is prevailing, and is not carried to any distance by the wind, as miasmata in fever; and so feeble is its influence in single cases, that it may be said scarcely to exist, and a cholera patient may be brought from an infected spot into one where a pure atmosphere exists, with perfect safety; he will rarely communicate the disease to other persons, even when subjected to the most intimate exposures. But it becomes infectious in the mass, and it spreads by infection, whenever the poison is assisted in its operation by the presence of those peculiar states which are acknowledged to predispose the body to disease.

The influence of predisposing causes in inviting an attack of cholera is well exemplified in fever, two diseases essentially different in their nature. On an attack of fever the patient feels cold; the blood forsakes the surface, and is collected in

the internal organs, and if drawn from a vein, is black and unoxydized; thus, (as in partial poisoning by carbonic acid gas from imperfect ventilation,) some of the more prominent symptoms of cholera are already present. The first steps towards the pestilence have indeed been made, and the superaddition of the others has been rendered comparatively easy; and hence it is, that during an epidemic constitution of the atmosphere, and during the stage of the disease we have supposed, frequently the fever is arrested, and instead of reaction taking place, vomiting, purging, &c. supervene. Here the action of the predisposing cause is well marked and distinctly traceable; but although the effects of fever are more obvious than the other predisposing causes we have enumerated in inducing an attack of cholera, it is not a whit more powerful in its injurious operation. A change is silently and gradually being effected in the human body wherever these noxious agents exist, and the constitution is thus rendered peculiarly susceptible to choleric influence.

In the same way, when cholera is prevailing in camp, where all are mingled together on the line of march, and all are more or less under its influence, a dose of neutral salts administered to any one will not unfrequently bring on an attack of the disease. In this instance we call into activity a disease which would have remained dormant in the constitution and would ultimately have been thrown off by the natural energies of the body. But it should be borne in mind that the same argument is equally applicable to fatigue, exposure to vicissitudes of temperature, unwholesome food, &c. They either directly invite an attack of the disease, or so reduce the natural power of the constitution that it is unable to bear up against the morbid influences by which it is surrounded.

Further, cholera possesses the power of attaching itself to and moving along with large bodies of individuals; and if the poison is not diluted by the dispersion of the infected body, and neutralized by its admixture with a purer atmosphere, the very air seems to become pregnant with this blight of human life,

and the mortality most appalling. It adheres to the mass even when there is but little evidence of its existence in camp, accompanies it in its course, and disseminates the seeds of the pestilence along the line of march, and that too, amongst a portion of the community, who previous to the arrival of the infected body seemed in perfect health, and who under other circumstances would have been entirely exempt from its attack. Cholera attacked our troops during the late invasion of China when they were suffering from fatigue, exposure, &c., and the disease extended its ravages amongst the inhabitants of the country, who had until then been unacquainted with it.

In towns, cholera uniformly in the first instance selects for its victims the poor and miserable, and those who inhabit filthy and ill-ventilated localities; and it afterwards extends its ravages to those portions of the town of an opposite character and inhabited by a superior class; and in camps the disease is attracted or generated amongst the followers, and its baneful influence is soon afterwards felt amongst the sepoys and officers.

If these premises are correct,—and some experience in the disease leads me to believe in their truth,—and if in connection with them we take into consideration the fatal character of cholera, the course which ought to be pursued is alike obvious and imperative. It is by prevention rather than by cure that cholera is to be overcome. Active sanitary measures should at once be resorted to, having especial reference to the removal of whatever tends to attract the disease, the avoidance as far as practicable of whatever predisposes the body to be influenced by morbid impressions, and on the first appearance of the pestilence the adoption of every measure calculated to arrest its further progress.

With the above object in view, I now beg to suggest the following protective measures; and should they be apparently expensive, that expense will be amply repaid in the preservation of European life, the avoidance of pensions for shattered constitutions, and the prevention of that misery and pauperism which follow the death of the male members of families.

I have attached to each suggestion a note, containing some of the reasons on which it is grounded.

Suggestion 1.—To avoid notoriously infected roads and localities where the disease is liable to break out.

Note.—Cholera evidently affects some localities more than others, and there are in the Madras Presidency towns and localities where the disease is a frequent visitant, and where regiments are very liable to be attacked. This peculiarity arises from their position, existence of impurities, want of ventilation, &c., but has no reference to the geological structure of the country. The progress of the disease through Europe and America, with its subsequent disappearance there, is sufficient proof against its arising from geological influence. If it depended upon such a cause, and was immediately produced by exhalations from the earth, the habitation of the disease would be local and nearly permanent, like ague, and would attack every town similarly circumstanced without reference to its size, purity, or condition of its inhabitants. But such is not the character of this disease, for although there is scarcely a town or village in Southern India which has not suffered since the disease became prevalent in 1817, still the larger towns and those where the predisposing causes abound are more frequently attacked; on such it will frequently descend *and attach itself for months*, and be fatal in its results in proportion to the existence of impurities and want of ventilation.

This point is well borne out by a reference to the towns in Europe where the disease chiefly prevailed. In Great Britain those towns suffered most which were located on the banks of rivers; and those inhabitants whose houses were nearest to the river, and who were most exposed to dampness and to the effluvia from the decomposing matter usually found in such situations, were carried off in great numbers. And if we look to the continent of Europe, and examine into the condition of the cities where the pestilence raged with the greatest violence, we are furnished with abundant evidence of the powerful influence of local impurities, &c. in attracting and retaining this disease.

Cholera attacked Warsaw during the rebellion. A walled town, crowded with the inhabitants of the surrounding country, the sick and wounded, and where all were suffering from anxiety, fatigue, and insufficiency of food.

I believe Berlin to be, without any exception, the worst drained city in Europe. Arising from the level nature of the surrounding country, all liquid impurities collect and stagnate in and about the town, producing a most offensive odour.

The old town of Hamburg, composed of narrow winding filthy streets, and intersected by several stagnant canals, into which the impurities of the town were thrown, emitting a most offensive smell, and looking the very abode of pestilence, suffered most severely.

The other towns were Dantzic, St. Petersburgh, Paris, London, &c.

Suggestion 2.—Every corps on the line of march should have attached to it an additional medical officer and extra medical subordinates.

Note.—Should cholera appear in camp, and the measure of breaking up corps into detachments, as recommended, be resorted to, these additional aids in the medical department would be required, and under all circumstances their presence would produce confidence.

Suggestion 3.—Reliefs of corps should be less frequent, and the stations to which they are removed less remote, than those which are at present selected. Unless for political reasons, no regiment should be marched beyond the nearest station.

Note.—Long marches harass the soldier and expose him to every morbid influence, increase the expenditure of the sepoy beyond his means, and oblige him and his family to resort to an inferior and less nourishing diet, one of the principal predisposing causes to cholera when taken in connection with fatigue.

Suggestion 4.—European and native regiments on the line of march should be unattended by families; and followers extra to the establishment should be strictly prohibited.

In the periodical movement of corps, more especially when passing through districts where the disease is liable to occur,

the regiment should be broken up into detachments. No detachment to exceed two companies, and to be separate from each other by at least one day's journey. Safety on the line of march appears in a great measure to reside in the smallness of the marching body, and more especially keeping from the encampment all followers who are not directly connected with the regiment, as the classes alluded to are always poor, filthy in their habits, and entirely exposed to the varying effects of the weather, and thus more disposed than the soldier to attract disease.

Note.—A regiment on the line of march may be in the highest order, and the most persevering attention may be devoted to its internal economy and the preservation of the health of the men; but as long as the camp contains five followers to every fighting man, and many of them in a state of great destitution, so long will the regiment carry along with it the germ of its destruction. Experience teaches us that the larger the number of individuals, particularly when suffering from the fatigue and exposure unavoidable on a march, the more liable is it, under peculiar states of the atmosphere, to be attacked by cholera. The immunity enjoyed by our artillery and escort detachments, by the Bengal and Bombay troops, who move without household incumbrances, bears out the propriety of the measure recommended; and I may also instance the Nizam's troops, who rarely suffer from cholera, and which is to be attributed in a great measure to the shortness of their journeys, the custom of sending on the families in advance, and also to the circumstance of many of these sepoys having left their families in their native country, the north-west provinces of Bengal.

Suggestion 5.—On the first appearance of cholera in a large body of troops, or in a regiment on the line of march, the most active measures should be resorted to with the view of extinguishing the disease. The affected body should be immediately broken up into as many detached parties as circumstances will admit of, and separated to some distance from each other. Fatigue and unnecessary exposure should be scrupulously avoided.

The number of men on guard should be reduced, and relieved morning and evening, and sentries every hour. No tent should be permitted to be struck until the sounding of the first bugle. On no occasion should the men be detained unnecessarily on the parade ground, but formed and marched off at once; and the regiment should endeavour to reach the encamping ground before seven o'clock in the hot weather. The route should be changed, if deemed necessary, and the new one pursued by easy stages. On no occasion should the regiment halt even for a day, but ought to move onwards, however short the distance, into clean ground and a purer atmosphere.

The men should be encouraged to prepare warm pepper-water or congee to be taken before marching.

Note.—As certainly as cholera is in many instances induced by the congregation of large bodies of men, so will the converse be found to hold true. The disease which was generated by the assemblage will be destroyed by their separation, and the scourge would be arrested by the adoption of those means of precaution which are acknowledged to protect the frame against injurious impressions. The disease would thus be nipped in the bud, instead of pursuing for an indefinite period, as it hitherto has done, its desolating career.

Cholera is a usual attendant at native festivals, where crowds of people are collected. At Juggernaut it is an annual visitant. "The town of Pooree contains 35,000 inhabitants, and the number of pilgrims sometimes amounts to 150,000. The inhabitants are usually quite healthy before the occurrence of the festival, which takes place in June or July; but immediately on the arrival of the pilgrims, and when the lodging-houses are literally crammed with inmates, cholera suddenly breaks out, and in the space of a few days hundreds are cut off by it. This is not an occasional or accidental occurrence; it is an invariable one, and the disease which had thus been generated, as suddenly disappears on the dispersion of the crowd, a few isolated cases only occurring for two or three days after the departure of the pilgrims." (Letter from Dr. Cumberland, Pooree.)

Suggestion 6.—The camp should be pitched on elevated, open, and dry ground, at some distance from, and to windward of the town, and spread over a considerable space, so as to admit of the most perfect ventilation and cleanliness within the camp, having especial reference to the bazar; and that portion where the followers are congregated should be carefully attended to.

Banks of rivers, water-courses, and confined localities, such as are found in the vicinity of hills and at the foot of ghauts, should be scrupulously avoided.

Note.—Cholera evidently shows a strong predilection for the banks of rivers, arising from their filthy condition, produced by fluvial deposits, from the stagnant pools, and the decomposing animal and vegetable remains which are usually found in their neighbourhood. This circumstance has long been remarked in India from cholera often pursuing the course of rivers, and in Bengal attacking with the greatest virulence troops proceeding in boats by the river route; and the same circumstance has been observed in Great Britain, when the disease prevailed there. In the towns of Sunderland, Dundee, Inverness, Haddington, Musselburgh, Dumfries, &c. the disease raged with the greatest violence, and their positions are low and damp, and on the banks of rivers; and it was also particularly observed that that portion of the inhabitants whose houses were nearest to the river suffered most severely; there the disease was not only more frequent, but the mortality was much greater.

Suggestion 7.—The number of tents supplied for the accommodation of both European and native troops when in encampment has always appeared to me quite inadequate for that purpose. The heat from their crowded condition is excessive, and the air soon becomes thoroughly vitiated, a state of matters at all times prejudicial to health, but which, when attended by a choleroid state of the atmosphere, cannot fail to be in the highest degree predisposing to its attack.

In wet weather the floor of the tent should be covered with a tarpauling, as there is no more powerful exciting cause of

bowel complaints than, after exposure to great heat during the day, lying on the cold damp ground all night.

At present, on the line of march, married men of native corps occupy tents of their own along with their families. In the event, therefore, of the families being separated from the regiment, additional government accommodation would become absolutely necessary.

Note.—In a perfectly still atmosphere, such as is often observed in India, and where the air is much rarified by heat, numbers of people cannot be collected within circumscribed limits with safety. The oxygen of the air, on which life depends, is rapidly absorbed, and its place supplied by the exhaled carbonic acid gas, which is again inhaled to the immediate injury of the powers of life, vitiating the blood, and which in its black unoxydized state is circulated through the whole system, producing a condition of the body analogous to the first stage of cholera, viz., drowsiness, coldness of the body, copious perspiration, vomiting, &c.; and if the patient is not actively treated, he dies of asphyxia, the immediate cause of death in cholera. No one can doubt that imperfect ventilation, the absence of a due proportion of oxygen in the atmosphere, and superabundance of carbonic acid gas, must facilitate an attack of the disease we are considering. Indeed, as above stated, several of the more prominent symptoms of cholera are immediately produced by it, and the superaddition of the others has been rendered comparatively easy; hence the disease commits its greatest ravages in crowded ill-ventilated barracks, bazars, densely populated towns, particularly such as are surrounded by walls, preventing the ingression of pure air; and in that portion of them, where carbonic acid gas is by the decomposition of animal and vegetable refuse being evolved, crowded school rooms, the inhabitants of a portion of a barrack in the vicinity of an open drain, native huts into which there is but one opening and that closed at night, whole families are frequently swept away from their exposure to this exciting cause.

But when cholera appears in a family occupying a superior

station in life, and in whose house pure air always exists, the disease is almost invariably confined to the individual first attacked, and which in most instances is to be attributed to an accidental exposure to a poisoned atmosphere beyond the walls of his own dwelling.

In conclusion, I beg most respectfully to impress upon the constituted authorities the necessity that exists for adopting such preventive measures as may be within our reach. The wisest policy and best feelings of humanity call upon us for exertion; and if this but imperfect sketch should awaken enquiry or in any way contribute to so desirable an end, the object of its writer will be most satisfactorily accomplished.

CHAPTER XVIII.

On the use of Saline Enemata in Cholera, in a Series of Letters, by Dr. Murray.

No. I.

So many remedies have at different times been extolled as specifics in this appalling disease, which have afterwards turned out to be inefficacious, or at least very undeserving of half the praise bestowed upon them, that I almost hesitate to announce any particular mode of practice as having been found pre-eminently successful. However, as it is the proper duty of all persons to give every information to the profession likely to tend to the public weal, I hasten to communicate through the medium of your pages, an extract of a letter I have just received from an intelligent and observant physician of the Bengal presidency, who has seen and treated cholera on a tolerably extensive scale, and who writes me on the subject as follows:

"Since last I wrote you regarding the great benefit I had obtained from the use of hot saline enemata in cholera, my confidence in this remedy was rather shaken by the unsuccessful result of it in some cases I had among the camp followers during our late march; but as none of them had any pulse at the wrist when I was called to them, and I am not certain that they got regularly what I ordered, I scarcely consider it to have had a fair chance. The natives have a very great aversion to enemata, and much reliance cannot always be placed in the native hospital attendants on such occasions. I

have since then, however, had a very interesting case of an European in the blue stage of collapse, when the remedy fully maintained the character I formerly gave you of it. It is the only thing in which I place any confidence in this advanced stage, having found most of the others usually employed, *but too often to do more harm than good,* and frequently to interfere with the salutary action, and the regular administration of the enemata.

"I have had too much professional experience to consider this remedy as infallible, nor shall I attempt to theorize in regard to its modus operandi; but I can say that it seems to have an exciting and exhilarating effect upon the ganglial nervous system; that it has the power of arousing vascular *reaction,* (which is the grand object of all our therapeutic indications in the stage of collapse,) and that I have not lost any European patient from cholera (and I have had more than 20 cases) since I began its use in 1834.

The ingredients I use are, common salt 1 oz., carbonate of soda or potash 1 drachm, warm water (at 120° Farenheit) 1 pint. This I give, *pro enema,* every half hour, hour, or two hours, according as I find it necessary; *i. e.* till the circulating powers are excited into *reaction,* and the pulse rises to a satisfactory degree of strength."

No. II.

I before wrote to you regarding the efficacy of hot saline enemata in cholera, in consequence of information I received, which I thought worthy of being communicated to the public.

I have since been favoured with another letter from the same gentleman, and I should not be doing justice to the information it contains if I did not authenticate it by my own signature, and recommend it to the notice of the profession.

The further particulars I have now to communicate, are chiefly relative to the use of the saline enemata; and I give them from my friend's letter (hoping he will excuse me) without his knowledge or authority. His letter runs as follows:—

"From being ignorant of the pathology, my treatment is purely empirical. We used to inject saline solutions into the veins, from its having been discovered by chemical tests that the serum of the blood in cholera patients is deficient in some of its natural saline ingredients, and the operation was certainly attended with astonishingly restorative effects; but, situated as we generally are in this country, this plan is impracticable; and therefore I was led to substitute the saline enemata, *as hot as the patient could bear,* which can always be readily and speedily administered. Of the *modus operandi* of this remedy I am ignorant. Its action is peculiar, however, and is first apparent in its allaying the spasms and vomiting, in increasing the volume and diminishing the frequency of the pulse, restoring the natural appearance and temperature of the skin, and renewing the secretions.

"This effect I have seen follow its exhibition after the pulse was imperceptible at the wrist and the other symptoms alarming, without the assistance of any other medicine. No febrile excitement followed, neither was there any secondary disease developed upon the restoration of the circulation, which leads me to think that the disease is not essentially one of inflammatory character, seeing that in the reaction after collapse induced by extensive burns and scalds, there is violent inflammatory excitement; and if cholera consisted in abdominal inflammation, I should imagine that the repeated use of hot stimulant injections would rather develope it; but these, along with bitter laxatives and an occasional mercurial, I have often found sufficient to complete the cure. The last case I had was in a drunken European gunner. When I first saw him he had vomiting, his pulse was almost imperceptible at the wrist, his skin was quite cold, he had cramps, and his voice was a whisper. The hot saline enemata were used, and the pulse became stronger, but remained frequent (120); warmth soon returned to the skin, and the vomiting and cramps ceased; but no natural secretions appeared. Mercurial purgatives were therefore given, and the enemata intermitted. He again became cold, and the enemata

were resumed and continued till the pulse rose. Calomel, opium, and castor oil were then given, and the enemata again intermitted; but still no natural secretions appeared; the pulse again sank in strength, at the same time that it increased in rapidity (137), and the coldness of the extremities returned. This was now 48 hours from the time of his admission and late in the evening. The saline enemata alone were ordered to be persevered in during the night, and in the morning I found that the secretions had become restored, and that he had had several copious yellow fæculent dejections; and after this his cure was soon *complete*. I have tried and seen used most other medicines of the Pharmacopœia; but in the advanced stages of this disease their action appears to be merely mechanical—the larger the bulk of the dose, the sooner it is vomited. After collapse my sole trust is in the saline enemata; and this feeling of confidence in them is indescribably cheering to me.

" I think what are called the secondary symptoms of cholera are very frequently the effects of the remedies employed; but when the collapsed stage continues long without intermission, (say a couple of days,) the blood becomes decomposed, and seems to give the disease a typhoid character."

No. III.

I have received the following report from Surgeon Morgan, relative to the outbreak and treatment of cholera in H. M.'s 57th Regiment, which I send you, as it contains some interesting observations; and as it was written for my private information and not for publication, I consider it the more valuable.

" The disease was novel to the men of the 57th Regiment, and, although they knew that it had been for some time in their immediate neighbourhood, yet they were not prepared to recognize it when it first presented itself among themselves. Thus the first three cases, as I may say, ran a fatal course before they were subjected to any treatment."

We shall pass over the description of the symptoms, treatment, and morbid appearances in these three cases, and the

notice of the fourth fatal case, as they do not bear upon the question of saline enemata, and proceed to the fifth case, which occurred subsequently to the receipt of your letter recommending a trial to be made of the hot saline enemata.

" The poor fellow was the hospital sergeant, a most temperate, well-conducted, young, and healthy man. Strange to say, although he had seen his comrades dying only a few days before in consequence of procrastination in reporting themselves sick, he suffered himself to fall a victim to the same error. He had been slightly ailing during the day (2d August), and at 2 P.M. was purged, which was several times repeated before 8 P.M.; but he said nothing about it, and thought it merely a slight irregularity of bowels occasioned by his having that day eaten some *cold potatoes* for dinner, which composed the chief part of his evacuations. He went round the hospital with me at 5, and again at 8 P.M., and I observed nothing the matter with him. He went to bed but did not sleep, was again purged, and at 2 o'clock P.M. (4th August) was seized with vomiting, when he ejected a quantity of cold potatoes and meat unchanged. He then felt very ill, and sent for Mr. Neville, who was in waiting that night, and who saw him immediately and found him with all the worst symptoms of cholera. Eyes sunk, voice shrill, pulse weak and easily compressed, skin moist and cold, vomiting continued, and the motions were *congee-like.* Agreeably to a memorandum left by me to that effect, a hot saline enema (of the prescribed form) was immediately given, and repeated every half hour. On my arrival it had been given ten successive times, and was persevered in till he sank at 2 P.M. He never showed the least symptom of rallying. The pulsation at the wrists ceased at 4 P.M. The other remedies employed were nearly as in the first cases, except that stimulants were very sparingly given, and diluents freely. His secretions were all suspended, except that of perspiration, which had a horrid fætor. With each enema there came away a quantity of rice-like flocculi, a characteristic symptom of the disease. Thus the first trial of the hot saline enemata failed, and they had perfect justice done

to them in all but the subject, and that was too far advanced. Three men from the barracks were admitted during the day and night in which these events are recorded to have taken place. The disease in all was in its incursive stage; the hot saline enemata were vigorously adopted in all from the very commencement, and continued until decided reaction set in. The rest of the treatment consisted in calomel and warm cathartics, with blisters and stimulant frictions. The reaction, I must say, *was speedy and far more salutary* than that from spirituous stimulants, which were here almost entirely withheld. Their convalescence has been uninterrupted, and I am glad to say no other case has since occurred."

No. IV.

I send you extracts of two other letters I have received from Surgeon Morgan, continuative of the history of the late appearance of cholera in H. M. 57th Regiment, and of the treatment which he pursued. It appears from all that I learn of the hot saline enemata, that they are a remedy of considerable efficacy when carefully and judiciously administered, and that they will form a valuable addition to the other approved means of cure.

" I have to communicate to you that although cholera did not altogether cease to afflict us after I last wrote, as I fondly anticipated, its further appearance has been restricted to three cases. Immediately after my former letter was despatched, they presented themselves. One of them, the man who laboured so long under scurvy (originating in the prison cells), whose case you called for, and who had been for some time at his duty, apparently in a state of rude (though recently acquired) health. He had been ill for eighteen hours before he reported himself, and when admitted he was in a state of collapse. All efforts to resuscitate him proved fruitless. The hot saline enemata were vigorously persevered in and stimulants employed, but in vain. The other two were brought under

treatment early in the incursive stage of the disease, and speedily recovered.

"The hot saline enemata I am inclined to think favourably of, especially in the early stage of the disease, assisted by calomel and opium, with powerful and extensive counter-irritation; but it is by no means a *self-sufficient* lever to raise the load that weighs upon the heart, or, perhaps, upon the brain. When you reach your patient pulseless, cold, and wet, with his voice a whistling whisper, his eyes sunk back in their sockets, his face blue, and his fingers like a washerwoman's (only more livid), I do not know that hot saline enemata will have any good effect if solely trusted to. There is not a doubt that internal stimulants ought then to be used (in moderation) along with them; and also external warmth, friction, shampooing, punkahing, and counter-irritation, without disturbing the patient much, which exhausts him. I have rather a partiality to the application of scalding hot water to the epigastric region and spine as a counter-irritant, as its effect is quickest, and seems to be most penetrating, rousing the suspended vitality. But, in many cases, I am certain nothing can succeed."

"I delayed answering your last letter under the idea that, as cholera had paid a second visit to the native population here, so possibly might it do to us; and I regret to have to communicate that it made its appearance yesterday in a soldier who had been eight days in hospital ill of dysentery, but convalescing. The invasion was sudden, and with such overwhelming severity that I prognosticated at once that it would prove fatal. The patient was seized at two P.M., and when seen, in fifteen minutes afterwards, he was cold, wet, livid, and nearly pulseless. As he had been labouring under dysentery, I considered it a good reason for interdicting internal stimulants. He got a scruple dose of calomel with two grains of opium in the first instance, after which the hot saline enemata (at the temperature of 118°) were sedulously administered every half hour, and vesicatory counter-irritants were applied to the nape

and præcordium. The calomel and opium dose was probably soon ejected, as the vomiting and congee-like purging were at first incessant; and I trusted chiefly to the reputed power of the enemata to relieve the symptoms and restore the suspended vital energies, withholding everything which could be considered to interfere with their salutary action. The most urgent complaint made by the patient, as usual, (indeed it is *invariable*, for it is the only symptom never absent,) was that of unquenchable thirst and craving for cold water, which was partially relieved by effervescing saline draughts frequently repeated; but no improvement was manifested in the state of the collapse. The vomiting and the spasms of the hands and feet, which were at first distressing, soon ceased; and my resolution in persisting in the plan I had adopted was encouraged by the patient's falling into a short tranquil doze, and expressing himself easier when he awoke. The enemata were therefore regularly continued every half-hour, consisting each of a pint of hot sea water, to which was added a drachm of the carbonate of potass. They were retained generally from two to four minutes, and, when passed, were accompanied with the characteristic rice-like particles which constitute the congee stool. He had received in this way six enemata, when, seeing that no warmth of body and no pulse were returning, and that restlessness with the alarming *sepulchral* moaning began and every moment increased, at five P.M. I determined to give a trial to cold affusion; but he sank rapidly, maintaining his intellectual faculties, however, to within a few minutes of his death.

"In this case there was strong evidence (at least I think so, from the gorged appearance of the subcutaneous veins) that *congestion* took place *very early* in the venous system. It was most apparent in the veins about the head, in those traversing the temples, forehead, and root of the nose; and it may be asked, would not bleeding, leeching, and cupping have relieved this? to which my answer from experience is, *no:* and the only explanation I can give of this is, that the supply of that mysterious agent, *the vital principle, nervous energy,* or what-

ever that may be called which constitutes life, had ceased to be furnished—the apparatus of the organs which elaborates this principle being destroyed as completely as it would be by a sledge hammer, or so deranged as to furnish a destructive instead of a vivifying agency. Supposing this to be the case, even if the congested vessels were relieved of a part of their stagnant load, the heart would not thereby be enabled to perform its part in circulating the remainder ; nor, supposing the mass of blood to be vitiated, if this were withdrawn and replaced by transfusion of healthy blood, could this operation be of any use, without nervous influence being supplied to keep the blood in a healthy condition, and to give the heart the power to circulate it. Neither could the stimulus of the injection of any saline solution in the veins be of avail. The morbific cause is, in such cases, so overwhelming as to render all human aid futile. 'The wheel is broken at the cistern.' It is remarkable that the intellectual functions do not seem immediately to participate in the destructive effect of the invisible agent, but only the animal powers.

" The saline enemata are probably as good as any other *single* remedy ; but this case proves that they are no *specific*, and that they are not to be relied upon for the cure of an *intense* case of the disease ; yet, they are not by any means to be thrown aside as valueless on that account. In this last case, no stimulating remedies having been used, the appearances were exactly such as are presented after drowning. The venous system throughout was congested, especially in the head ; yet I do not think that this was the cause of the mischief, but the effect of it, and perhaps only one of the *minor* effects ; for the mental powers remained intact till nearly to the end of life. The stomach and small intestines were natural, and any unhealthy appearance in the large intestines was rather attributable to the disease with which the patient had been previously affected than to the effect of cholera. In short he died of asphyxia."

No. V.

"The only case of cholera I have had lately was the following in a sepoy.

"*Petiah, aged* 30, admitted 3d September, 1838, at 3 P. M. with vomiting and purging of congee-like fluid. Countenance collapsed; cramps in the extremities; no pulse at the wrist; extremities cold; voice a whisper. He had been ill eleven hours, and was ordered—of compound spirits of ammonia and tincture of opium, each 20 drops, with water 2 ounces, by the native assistant on admission, before I saw him. 4 P. M. Has vomited twice, and has had two motions within the last hour; other symptoms the same as before reported. Let him have an enema of common salt ½ oz., carbonate of soda 1 drachm, hot water (120°) one pint; to be repeated every half hour. 7 P. M. Has got the enemata. The cramps have subsided; he has had three evacuations, but without any regular fæces in them. His voice is improving. The pulse is perceptible and is 120, fluttering and irregular. Hands getting slightly warm. Complains of thirst. Continue the enemata every half hour, and let him have an effervescing draught every hour. Midnight. Has had eight enemata. No vomiting nor cramps; skin warm: pulse improving. To continue the enemata and effervescing draughts every hour.

"4th September.—The enemata were continued till 4 A.M. when he fell asleep, and slept soundly for two hours. 6 A.M. He now feels much better, but no fæculent matter has appeared in the stools. Pulse 112 and weak; skin warm; tongue dark; thirst less. To have 5 grains of calomel immediately, followed in two hours by an ounce of castor oil. Thin sago occasionally. Noon. Two yellow motions. Vomited twice soon after taking the oil, when a sinapism was applied to the pit of the stomach. Has not vomited since. Continue a little sago occasionally. Vespere. Has had two more liquid yellow stools, and the renal secretion has become free. He slept during the afternoon. Pulse 104 and more full; skin warm. 5th September. Has slept well; no motion; is very hungry; pulse 88; tongue clean; skin natural. To have a dose of infusion of senna and cheryetta. Vespere. Bowels open; no complaint. 6th September. Convalescent; slept well; pulse 84; appetite good; feels strong.

"I must be allowed to make a few remarks on the above case. It was in an advanced stage, and I considered the case a very fair one for the trial of the saline enemata. I took means of insuring their being regularly administered, and the result was very satisfactory. No remedies were given that could interfere with their operation until after reaction was fully established.

Perhaps the natural alvine evacuations would then have been restored without the calomel; but I thought it safest to give it, and I did so at a period when I was sure it would operate, viz. *after reaction.* I do not think this man could have lived two hours longer at the time he was admitted had he not had medical aid. No secondary disease became developed. Where this does occur, it seems to be the effect either of medical treatment or of concurrent cause."

CHAPTER XIX.

Report on Cholera in H. M. 57th Regiment* at Cannanore in 1838, by A. B. Morgan, Esq.

Cholera made its appearance in the 57th Regiment on the 23rd July. The epidemic (if it may be so called) had been ravaging the various towns and villages along the sea coast for upwards of a month previously. Its origin is considered to have been traced among the lower order of natives, to the tainted condition of half dried fish used as food, and the imperfect shelter afforded by their huts from the inclemency of the weather; but from whatever source it arose, it swept with most fatal malignity along the Malabar coast, apparently concentrating its greatest force at Tellicherry and this station, where the native population was nearly decimated in their crowded pettahs and bazars. The previous monsoon having in a great measure failed as compared with former seasons, the atmospheric temperature ranged much higher, and hence probably certain conditions of the atmosphere resulted unfavourable to health, to which may perhaps be attributed the unusual severity of many of the diseases of the soldiery stationed here, as well as the appearance of cholera. During the presence of cholera there was a remarkable melioration in the usual frequency and intensity of rheumatism and catarrh, but an increase of dysenteric cases.

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Towards the end of August the frequency and intensity of

* We have given in the previous chapter a considerable part of Mr. Morgan's account of the cholera which broke out in this corps.

the epidemic began to decline, and by the beginning of September it had almost ceased; when on the 6th of that month it reappeared in one of the native pettahs close to the camp bazar, and on the 8th fell upon a soldier who had been eight days in hospital ill of dysentery, but convalescing. The invasion was sudden, and with such overwhelming severity that I prognosticated at once it would prove fatal. The patient was seized at 2 P. M., and when seen in 15 minutes afterwards, he was cold, wet, livid, with both the pulse and the heart's action scarcely perceptible.

The morbific cause is in many cases so overwhelming as to render all human aid apparently futile; and it is from the intensity of cholera being so variously modified in different places and at different periods, that it is so variously reported. At one time it is easily managed, and remedies then used are cried up as infallible, which on other occasions, when tested, are found worthless, or worse than useless.

From the numerous visitations I have witnessed of this disease since I came to this country, and the different modes of treatment I have seen tried, decidedly I have the greatest confidence in the practice where internal stimulants are withheld, with the exception of small quantities of ammonia and spiritus ætheris nitrici. To a person unaccustomed to see the disease, and who has not watched its *natural* progress, nor had an opportunity of observing the effect of different modes of medication, the use of stimulants may appear indispensable for rousing the depressed vital powers; but a fair share of experience will scarcely fail to shew him, if a strict observer, that in a very bad case this class of medicines will not excite the slightest reaction:—that in a less severe degree of the disease, they will induce a transient reaction to which irremediable collapse will succeed;—and that in a mild case they are not only unnecessary, but do positive harm, by inducing too violent (injurious) reaction, which will frequently terminate in strong pyrexia (called secondary fever), attended with cerebral congestion, serous effusion on the brain, and coma, which no de-

pletion or counter-irritation will avert or remedy. Hence I would wish to state it as the result of my observation, drawn from an extended experience, that the exhibition of strong stimulants *in all stages* of cholera is oppressive to the enfeebled (blighted) vitality; in very bad cases being perhaps worse than useless; and in the less severe ones overpowering the vital spark by exciting a stronger degree of re-action than it is capable of sustaining.

The treatment which I consider to be the safest and best is the mild antiphlogistic, (at least not stimulant,) with moderate doses of calomel and opium, and cold diluent drinks. My recollections of the patients always revert to the grateful effect of cold affusion on the head, and make me think very favorably of this remedy, as it tends to produce quiescence, and thus enables the patient to fall into a refreshing doze. I would also prescribe the hot saline enemata. But it is difficult to appreciate the effect of any one remedy in this ever-changing disease.

It is an excuse frequently made by practitioners for the want of success in their practice, that the patients come in too late to afford them a fair chance of recovering by the use of medicines; but for army medical officers this tells greatly against their own sanitary arrangements, and the economy and discipline of their corps, which ought to be such as to enable them to detect men speedily after becoming ill. To this charge I have myself to plead guilty in some degree on the outbreak of cholera in the 57th regiment at this time; but it will teach me to be more circumspect in future, so as not to have to blame myself, or to be blamed for a similar oversight of duty.

It is satisfactory to review the little damage sustained by the corps at large from this scourge: the total number of soldiers attacked was 21, of which eight died. To the precautionary measures adopted by the commanding officer in withdrawing certain guards from the bazars and other infected places, and the restrictions placed upon the men generally to confine themselves within the limits of their lines, I mainly attribute their immunity from a more serious visitation. The disease appears

to have been confined to a few men who had been exposed to its influence probably prior to the operation of the restrictive measures.

From my speaking of cholera in this manner, it may be supposed that I believe in its property of spreading by contagion or infection; and I would wish to say on this point, that we have no reason to pronounce that it does not do so; at the same time I think it would do more harm than good to promulgate that it does, although we should quietly take prudent precautions against it.

CHAPTER XX.

Summary of Treatment.

A summary of the various remedial measures that have been employed by the several authors of these reports, will, it is believed, add to their practical utility; but in order to appreciate the value, and regulate the periods at which we can hope to derive benefit from medical treatment, it is first necessary to notice the pathology of the disease, the order in which the symptoms occur, and the morbid changes produced in the natural functions.

The poison having entered the system through the lungs, manifests itself in a longer or shorter period, according to its intensity, and the peculiar susceptibility of the patient; the first effect of the morbid action shewing itself on the nervous system, —indicated by sudden weakness, vertigo, and tendency to faintness,—when the vital functions which are influenced by the ganglionic nerves, the vitality of the blood, (as evidenced by its altered physical qualities,) and the whole circulating system become simultaneously implicated.

Purging is, in most instances, the first symptom of the disease, in the order of occurrence, which attracts serious attention, and is by some persons considered to be the essential and primary affection; but as looseness of the bowels does not always precede the other lesions of function, the altered state of the blood, in true cholera, cannot be said to be dependent on, or result from the alvine discharges; and it is an unquestionable fact, that the most fatal and rapid cases are by no means

those which are distinguished by excessive evacuations. Innumerable instances, on the contrary, are met with, of death ensuing after one or two watery stools, without the developement of any other symptoms affecting the natural functions; and, in Scot's Reports, cases are related, in which collapse came on even before any evacuation by stool had taken place.

The truth of these remarks is borne out by numerous instances recorded throughout these pages. In a case in which blood was drawn thirty minutes after the first symptom of the disease appeared, it was found to be changed to a dark or blackish colour; and, in the worst cases, purging takes place along with the failure of the pulse at the wrist, the powers of respiration, circulation and assimilation appearing to be arrested at the same moment, by the violence of the attack. From the peculiar functions of the alimentary canal, the bowels are easily excited to increased action, for we even find that violent mental emotions occasion irritability of them in persons otherwise in health; hence the fact of diarrhœa being generally the first symptom produced by the action of the poison, is to be attributed to the known irritability of the intestinal canal.

Vomiting often occurs nearly at the same time with the first discharge from the bowels; but it cannot be said to be an equally well-marked feature of the disease. In some few cases it is not present at all, and it is more troublesome in all, in proportion to the quantity of fluid drank by the patient. Again, in some cases, from the commencement, emesis is a constant and most distressing symptom, though, in the worst form of the disease, if it does occur, it soon ceases, apparently, from want of ability in the stomach to evacuate its contents, and hence the inefficacy, in such cases, of all medicines, however powerful they may be.

Cramp is not generally seen at the commencement of an attack; but when the skin becomes cold and the pulse very weak, shewing a decided change both in the circulation and respiration, this is a constant and most distressing symptom, particularly in European subjects. In the natives of India, however, either from a laxity of muscular fibre or being of less irritable

habits from their simple manner of living, cramp is more rarely a prominent affection.

Along with the first alvine discharge, or in many cases for some hours previous thereto, the patient experiences an unaccountable giddiness and feeling of debility, a tendency to syncope, ringing in the ears, with præcordial oppression and nausea, analogous to the phenomena observed in cases of snake-bite, and in persons struck by lightning. The state of the skin and of the circulation may not be perceptibly altered at first, though the pulse is sometimes found to be slightly accelerated, and its volume lessened.

In the majority of cases the attacks commence between midnight and 4 A. M. The patient has a sudden call to stool, and the result is usually a very copious fæcal evacuation, attended with slight prostration of strength; the morbid condition progressing, the bowels are again moved, the evacuation being found to be altered in character, i. e. more fluid, and containing less fæculent matter, and the debility increases, accompanied by the symptoms enumerated in the preceding paragraphs. This is the usual course in which events present themselves at the commencement of an attack, whether of choleroid diarrhœa or of true cholera, there being no diagnostic marks to distinguish the two forms of the disease "*à priori*," the one often running into the other, if unchecked, the difference appearing to consist in the intensity or severity of the symptoms. The greater virulence of the generality of attacks in India, is sufficient to account for the absence of the premonitory diarrhœa, which is so generally present in Europe; for when an epidemic is of a mild form, or towards the close of an outbreak, when the cases are usually seen to be less severe, this symptom is found to occur; but in the epidemics recorded in these pages, in most of which the disease was of a very deadly or low type, *the presence* and not *the absence* of the premonitory diarrhœa may be considered as the peculiarity.

If the patient is seen in this stage, which has not unaptly

been called " the premonitory condition of cholera," before the functions of the stomach are so far impaired and enervated as to deprive the organ of the power of acting on the substances taken into it, and whilst the circulation is but little impaired, the natural temperature of the body being unaltered, we may hope, if remedies are promptly used, that appropriate treatment will arrest the disease. In this stage recovery takes place under various modes of treatment, but in some instances the symptoms being, to all appearance, equally favourable when first seen, however prompt and active the application of remedies may be, no combination of medicines will be found to arrest the progress of the disease. Should it, therefore, not be checked at an early period, it gradually passes into the malignant form; the alvine discharges assume the true choleraic characteristic, resembling rice-water in appearance; and the stage of collapse, distinguished by the impeded circulation, difficult respiration, and diminution of animal heat, rapidly ensues. The whole surface of the body soon becomes cold and death-like; the skin is covered with clammy sweat and nearly insensible to external stimulants, the power of absorption being lost. The stomach partaking of the same atony, its nervous energy becomes suspended, it is unable to act on the various substances which are taken into it, and the organ is little better than an inanimate substance.

The division of an attack of cholera into two distinct periods, is of much practical importance, as the remedies which we employ must have reference to the stage of the disease in which the patient first comes under treatment.

In the first period, the indications of cure are,—to arrest the inordinate discharges from the bowels,—to arouse the depressed functions of the nervous system and of the organs of circulation, —and to prevent, if possible, the loss of animal heat which seems to be accelerated by the watery exudation from the skin.

To fulfil the first of these ends numerous astringents are used, and along with them, stimulants are also indicated, and very generally employed. Sinapisms to the cardiac region, and

strong counter-irritation applied to the epigastrium, are also advantageous. The patient should be covered warmly with blankets.

Venesection has been advocated by many, and very generally practised in this stage of the disease; but to be of service it should be performed early, before the heat of the body is much diminished, and the skin has become clammy. The blood at first flows with difficulty, is of a dark colour and thick, but in many cases after a small quantity is drawn it loses these characters, and becomes florid, the pulse rising in frequency; this I have repeatedly witnessed. Can this change be simply the effect of the abstraction of a few ounces, when the whole circulating fluid is dark alike? Is it not rather produced by the healthy organization of the blood being in some measure restored by the operation, the heart itself, relieved of its congestion, being enabled to act with greater vigour? The heart thus freed, by a portion of the vitiated blood being removed, receives a fresh impetus, and if stimulants are given at this time, they are enabled to produce their wonted effects, and the circulation becomes re-established. Bleeding should always be performed in the recumbent posture, as syncope is readily induced by the abstraction of a few ounces of blood in the upright position. The following description of its effects is given by a patient, himself a medical man. "There was a sensation which I am at a loss to describe, as if my heart was ceasing to beat, and a dread of suffocation; this sensation was instantly relieved by bleeding, and I recovered immediately."

Emetics are constantly given in the early stages, but their use appears to be based principally on theoretical grounds; by some, they are described as acting beneficially in arousing the stomach from its atony, and in emulging the biliary ducts; whilst, by others, they are given with an idea that the shock caused by their action aids in restoring the circulation; for this latter purpose mustard emetics, and antim. potass. tart., have been strongly recommended by many practical men, and we may therefore conclude, that they have occasionally been found useful.

I shall now notice, more at length, some of the various medicines which have been principally employed in Indian practice.

Calomel, in large doses, was long a favourite medicine with the older practitioners in India, from an idea that in such doses, in addition to its other effects, it possessed peculiar sedative powers; the usual routine having been to administer calomel ℈i, opii gr. ij immediately, on the patient being seen, and to repeat the dose every hour or two, according to the judgment of the prescriber. It is allowed by every one, that calomel possesses no specific power over the disease, and is useful, when combined with opium, in restraining the violent action of the intestines, and allaying emesis; when the violence of the disease subsides, it then exerts its peculiar power in restoring diseased or suspended secretions. The experience of late years, however, has taught us, that the same effects may be produced when this medicine is given in much smaller quantities, whilst large doses are thought by many to hasten death in bad cases; and in those which recover, the salivation, which it often occasions, retards convalescence. Calomel in small doses is used by most practitioners, and the following formulæ are highly recommended :—calomel, pulv. capsici āā grs. iv, opii gr. iss or gr. ij, assafætidæ gr. ij, ol. menth. pip. m. i, to be repeated at intervals whilst purging continues, until 8 or 10 grs. of opium have been taken. Dr. Lorimer remarks,* "I cannot forbear recording my testimony to a combination of medicines, which in warding off and checking an attack of cholera, in numerous instances, both in Europeans and natives, has been followed with the happiest results. The remedy consists of quinine, calomel, and opium, in the quantities of six, four, and two grains respectively, followed by a wine-glass of brandy diluted with a little warm water; this given within the first hour or two of seizure will be found in a large proportion of cases, to check the disease, (in my own experience it has never failed)."

The combination of nitro-muriatic acid and opium has been

* Reports on Cholera, Madras, 1846.

very extensively tried, and with the best results, the doses being, acid. nitric. m. ij, acid. hydrochlor. m. i, tinct. opii. m. x, water ℥ j, to be repeated every hour or hour and a half; the effects are sedative, stimulant, and astringent; and from the influence which this combination of medicines possesses in certain states of dyspepsia, I am inclined to think it a remedy of some value, in the treatment of early stages of cholera.

Sugar of lead and opium are acknowledged by most practitioners, to be one of the best combinations which we possess, in arresting purging, in the premonitory stages of cholera, given in doses of grs. ij of the former, and opium gr. i, repeated according to circumstances. Along with stimulants, this combination is most efficacious in allaying irritability of the stomach, and in mild cases, will often cut short the disease. The following formula has been advantageously used, to a great extent, amongst the native population of India :—plumbi acetat. gr. ij, opii gr. iss, camphoræ, pulv. capsici āā gr. ij, to be repeated every hour or two, until four or five doses have been taken.

Opium, in some shape or other, enters into most prescriptions, and is of essential benefit in restraining the alvine discharges and stopping emesis; but from the tendency to coma and stupor, in this disease, great caution is necessary in its administration; 8 grs. of solid opium, is the largest quantity which I should consider it safe to use, during an attack of cholera.

Stimulants are of great use in the incipient stages of cholera; but it would be tedious to enumerate all the medicines of this class which have been prescribed; a few may, however, be mentioned, which have been tested by experience, and are found to be of real service. Of these the spirit. ammon. aromat., the spiritus ætheris sulphurici, and sp. æth. nitrici are the best, and the carbonate of ammonia and camphor, when we wish to administer stimulants in the solid form, for fear of inducing vomiting; quinine, from its influence over the nervous system, appears to possess a certain power in counteracting the effects of the poison, when given in the early stages. The Indian hemp has also been

advantageously used for this purpose, with the effect of almost immediately raising the temperature of the skin.

If the means pointed out, fail to arrest the disease in the first stage, little success can be expected from internal remedies, when the collapse is fully developed. In the absence of any known antidote against the effects of the poison, our objects must be to endeavour to remove congestion, to arouse the sluggish circulation, and to support the strength until the state of collapse has passed away; to relieve the cramps; and to allay as far as possible the urgent thirst. As before remarked, when the powers of absorption are lost, it is worse than useless to pour quantities of medicine into the stomach. Cold diluent drinks, such as lemonade, effervescing draughts of carbonate of soda, and ammonia, and citric or tartaric acid, and soda water or weak nitric acid drink mixed with thin arrowroot, to which may be added a little brandy, are always most grateful to the patient in assuaging thirst; bitter beer and champagne are also very much relished, and are often retained when the stomach rejects everything else. During the existence of complete collapse stimulants are worse than useless, external applications and enemata being the chief remedies which are beneficial at this period.

1*st Remedies. To relieve cramps.*—Frictions with various stimulating embrocations have been recommended, but the annoyance which they cause to the patient is quite sufficient to counterbalance the good produced by them. The application of flannel bandages, has been found more efficacious for this end, than any other mode of treatment. The following method has also been used:—"When spasms are severe in the extremities, the nitric acid applied gently with a feather acts like a charm, and very seldom requires two applications; it should be applied with a very gentle and steady hand, from back to front of the leg. The only objection I have to it is, that when not gently or properly applied, it is liable to cause sloughing and deep ulcerations, which take a long time to heal; but after all it is a satisfaction to possess

a remedy capable of relieving the excruciating pain of spasm."* Bags of warm sand applied to the feet, are of service in preserving the heat of the body; frictions of flour or hot ashes over the extremities are also favourite remedies with the natives of India, and are certainly useful in absorbing perspiration and preventing evaporation.

2nd.—*Cold baths.*—The cold *douche* as a remedial agent, is highly recommended, not only in the invasive period, but also in the last stages of disease. I have known the most marked benefit obtained from dashing cold water on the face and head, when the patients were sinking into collapse, and when, except the head, the body was all over cold, and the pulse almost imperceptible; the patients in these cases often expressed themselves revived, and called for its repetition.

The use of hot baths is now relinquished by universal consent, having been found from experience to be injurious in various ways, but chiefly, from the fatigue and upright posture, inducing fatal syncope.

3rd.—*Enemata.*—Saline enemata have been used with much success by many; but they do not generally come up to the high estimate which was at first formed of them.

4th.—*Electro-magnetism.*—Several persons have tried the effects of shocks of galvanism passed through the chest, and one of the reports relates 35 cases which were subjected to this treatment. Galvanism possesses the power of arousing the depressed nervous system and of invigorating the circulation, but its effects are not permanent.

5th.—*Saline injections into the veins.*—In addition to the various modes of treatment which have been employed from time to time in cholera, including almost every thing that the most active and inquiring minds could suggest, the injection of saline fluids into the circulation, through means of the veins, may be mentioned.

Recourse to saline injections seems to have originated in the

* Madras Quarterly Medical Journal, vol. i. p. 123.

supposition, that the state of collapse and altered condition of the blood were attributable to the deterioration, both in the quantity and quality of that fluid, occasioned by the excessive and rapid waste of its serous or more fluid parts, poured out from the intestinal canal. Several trials have been made of this treatment by the medical officers of the Madras Presidency, since the idea was first suggested; but those to which we more particularly refer, were the experiments conducted by the late Surgeon Malcolmson in the hospital of the Madras European Regiment at Secunderabad in 1832. The saline substances employed were solutions of the carbonate and muriate of soda, largely diluted, and injected into the venous system, by means of the ordinary apparatus for the transfusion of blood. The quantity of fluid at first thrown in was from 1 to 2 lbs., heated to the temperature of the blood, which was subsequently increased to as much as 8 or 10 lbs. in some instances.

The immediate, or primary effect, of this remedy was to restore the enfeebled circulation; the action of the heart and arteries being invigorated, and the pulse, (which may have previously been imperceptible at the wrist) becoming strong and full. The temperature of the skin also, from being cold and clammy, became warm, and the patient aroused from a state of almost inanimate collapse, sat up, talked, and expressed himself relieved. This improvement was, however, found to be transitory; symptoms of collapse soon began to return again, the patient became covered with profuse cold sweat, and after relapsing into a state of extreme prostration, the vital powers could not be again stimulated to action.

There are, however, great difficulties in the way of this operation, and the success which has attended it has not been sufficiently encouraging to warrant its extensive use. Should an antidote to the poison ever be discovered, transfusion appears to be the only available means of introducing such an agent into the system, during the stage of collapse.

6th.—*Oxygen gas.*—Oxygen gas has been used in the low stages of cholera, with the effect of immediately restoring the

heat of the skin and raising the pulse; the inhalation being continued for four or five hours at intervals, whenever the pulse began to flag.

In favourable cases, when the skin has regained its natural heat, and the pulse has improved in strength, if the bowels are not naturally moved, the administration of aperient medicine becomes requisite; small doses of castor oil and laudanum, or aloes and calomel, àà gr ij, to be repeated every three hours, are excellent medicines, producing fæculent motions without purging. But great caution is necessary in prescribing purgatives, for frequently, after partial reaction has taken place, bile has reappeared in the stools, and the pulse has become perceptible at the wrist, the action of a dose of pulv. jalap. com., or of colocynth, has been known to produce sudden and fatal relapse. In secondary fever, the treatment must be regulated on general principles, bleeding either local or general, blisters to the nucha, cold lotions to the head, purgatives and mercury, being occasionally requisite to subdue congestion occurring in important organs.

Prognosis.—At the commencement of an attack of cholera it is next to impossible to foretel what may be the result, so variable are its features, and so rapid the changes produced. Cases to all appearance progressing favourably, are sometimes unexpectedly lost, without our being able to perceive any cause for the fatal change, and recoveries take place after the patient has lain, as it were *in articulo mortis,* for hours. The cessation of purging, at the same time that the pulse returns, and the heat of the skin is restored, with a disposition to sleep, are indications of recovery; but, the patient cannot be considered free from danger, until the secretion of urine is re-established, and the alvine evacuations become tinged with bile. On the other hand, when the collapse is early developed, and the respiration, at the commencement, is much oppressed, the heart's action being early lessened in force, and the skin and tongue icy cold, these may be looked upon as sure indications of a fatal result. The temperature of the tongue is described as

being an excellent criterion of the severity of the disease, for it is invariably cool or cold, in proportion to the intensity of the state of collapse, and its returning warmth indicates the coming improvement. The heart's action, as indicated by the stethoscope, is a good guide to the prognosis, a feeble cardiac impulse being communicated by the stethoscope, even in cases where the pulse continues to be nearly normal at the wrist. Again, in a great many of those who have the disease, apparently in its worst form, but in whom the heart's impulse continues strong, recovery may be predicted.

There are some circumstances, which, though they are occasionally observed in other diseases, may be regarded as especially characteristic of epidemic cholera; these are the great variety in its general features, and the dissimilarity in symptoms, which are seen to prevail at different times. Thus, when a regiment on a march is attacked with cholera, we often find the cases distinguished throughout, by the prominence of one particular set of symptoms, and the absence of others. In one epidemic all the attacks will be seen of the low form, unattended with vomiting or cramps, coming on without premonitory symptoms of any kind, the attacks being sudden, and not preceded by any feelings of previous indisposition. In another visitation, premonitory symptoms prevail for some time, these cases being generally mild, though the vomiting and cramps may be severe, and consecutive fever frequent. Vomiting will be a prominent symptom throughout one epidemic, and in another entirely absent; the same also may be said of cramps. In general the cases become milder towards the termination of an outbreak, though at other times, on the contrary, they are found to be more fatal at its close; but whatever the distinguishing feature may be, it is usually seen to prevail throughout the entire course of the epidemic. This in a manner accounts for the contradictory opinions which have been published on the subject of cholera, and the transient reputation which certain remedies have obtained, as possessing specific powers,—from having, perhaps, relieved the prominent symptoms in a particular epidemic in

which they were employed, and being found comparatively useless in others.

These peculiarities in the features of cholera, render the practical knowledge of any one individual, however great his opportunities of observation may have been, of but little value, in comparison with such an accumulation of facts as are to be found recorded in these pages, and which, though they contain no new views, show that the opinions promulgated in recent works upon the subject, published in Europe, have been anticipated in India, and that since the appearance, in 1823, of the highly-valued reports of Mr. Scot, which were collected and published under the auspices of the Madras Medical Board, the press of India has been constantly employed in heaping up supplementary information on this most important subject.

THE END.

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